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ON THE COVER Starting in St. Bees and ending in the North Sea village of Robin Hood's Bay, England's Coast to Coast trail (here, in Yorkshire) cuts through history and time. *PHOTOGRAPH BY MICHAEL FREEMAN*

WALLY MCNAMEE / CORBIS; MARK TWAIN PAPERS, BANCROFT LIBRARY, UNIVERSITY OF CALIFORNIA, BERKELEY; LOUISE GUBB / CORBIS SABA; DICK WATERMAN / GOVINDA GALLERY, WASHINGTON, DC

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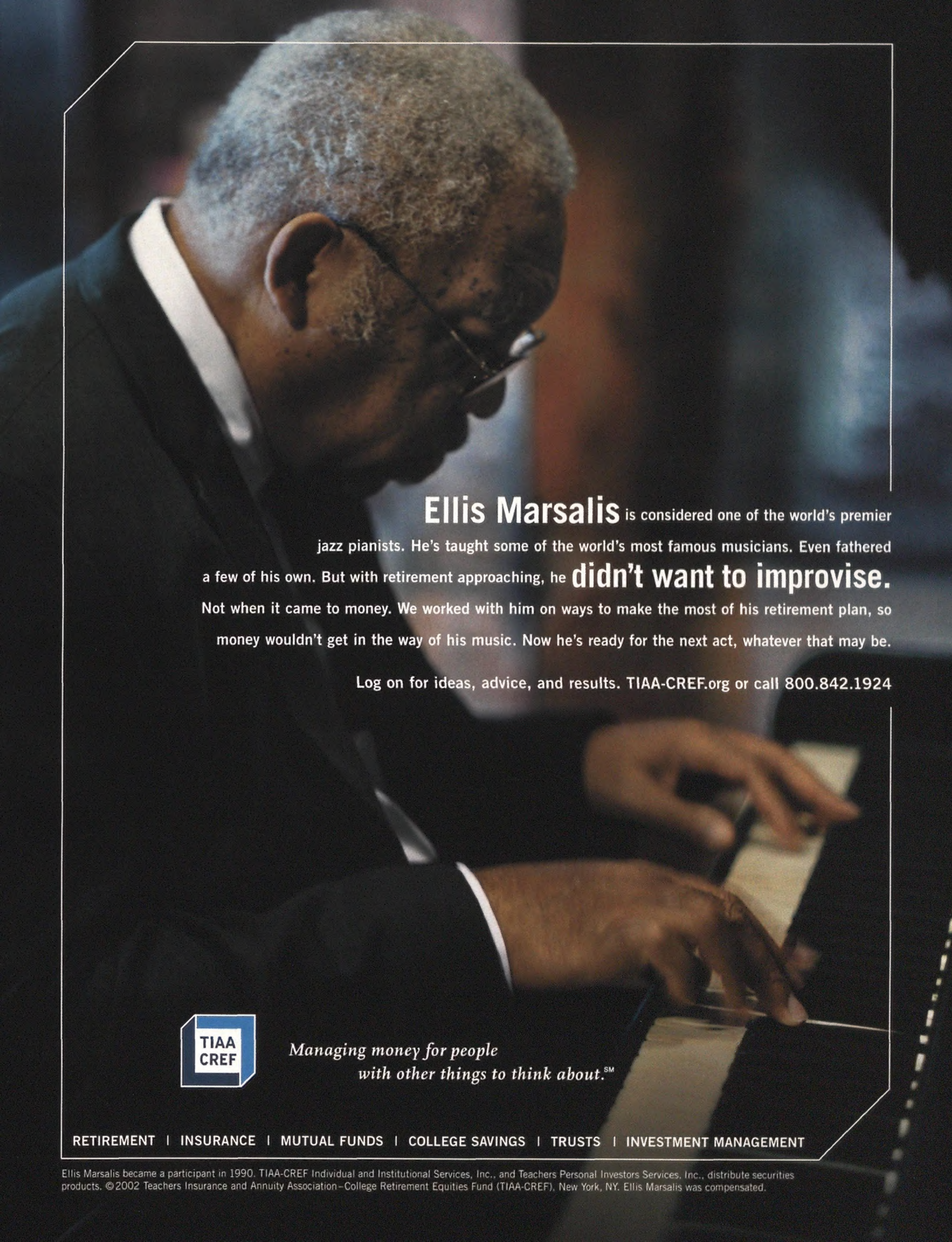

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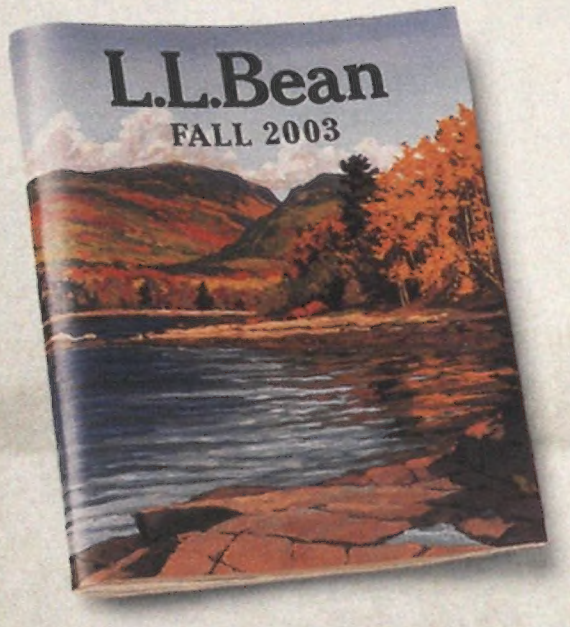

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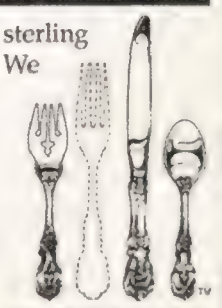

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Picture This

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BY CAREY WINFREY

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Now for the rest of the rules. The contest is open to anyone age 18 and over except Smithsonian Institution employees, their immediate families (children, siblings, parents and spouses), and others living in their households (whether related or not). No purchase is necessary. Professional photographers (meaning people who earn more than half of their annual income as photographers) are also ineligible. Please submit no more than one print for each category. Entries must have been shot and be owned by the entrant. Images previously published or pending publication are not eligible. By entering the contest, you agree that SMITHSONIAN may publish your photograph and name and may use both in future promotions of the magazine. The magazine will not be responsible for lost, delayed, damaged, misdirected or illegible submissions, and photographs will not be returned.

CLOCKWISE FROM TOP RIGHT: NEIL WHITING; BRIAN NOYES; MOLLY ROBERTS; CAREY WINFREY (2)

Because of the large number of submissions, we will not be able to acknowledge receipt of your entry or entries. Please don't e-mail or call us about submissions. Fifty finalists—ten in each category—will be selected by SMITHSONIAN editors; finalists will be notified by March 31, 2004. At that time, finalists will be asked to submit an original slide, negative, or digital file. (Digital files should be not less than 300 dpi at 5 x 7 or four megabytes.) Those materials *will* be returned.

We will award five winners, one in each of the photo contest categories as well as a sixth, grand-prize winner. The winners of each category will receive $500. The grand-prize winner, chosen from the 50 finalists, will receive $1,000. Any taxes on the prizes will be the winners' responsibility. Winners must sign an affidavit and license in order to receive their prizes. We will publish the winning photographs, and perhaps some runners-up, sometime in 2004.

All entries must be postmarked by December 31, 2003. Prints may be from digital high-resolution or film originals. Send your submissions by mail to Photo Contest, SMITHSONIAN Magazine, P.O. Box 50383, Washington, D.C. 20091. Please do not use Federal Express, UPS or other overnight services. The contest is void where prohibited or restricted by law.

The contest categories, drawn from those subjects we're especially interested in (that are also capable of being photographed), are:

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PEOPLE—Portraits, both studied and spontaneous, of individuals or groups from all walks of life.

THE ARTS—Depictions of art, sculpture, textiles, etc., and of people interacting with same or in performance.

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Man's Reach

The Cooper-Hewitt explores the wide-ranging impact of historical and contemporary designs

THE COOPER-HEWITT, National Design Museum is the Smithsonian museum most distant from the great cluster of the Institution's buildings in Washington, D.C. But given its purpose, it couldn't be more appropriately situated than in New York City, where artistic innovation and daring—on, off and over the edge—have traditionally come with the territory. The Cooper-Hewitt is the only major museum in America whose sole purpose is to celebrate historical and contemporary design. Indeed, it's one of the largest showcases of design in the world. And what, exactly, is meant by design? Well, the Cooper-Hewitt collects in four principal categories—prints, drawings and graphic design; product design and decorative arts; wall coverings; and textiles—but to name them is only to hint at the variety of what qualifies for display in the museum's Upper Fifth Avenue Georgian Revival mansion (which was built for Andrew Carnegie in 1902 and is itself a notable achievement of design).

In fact, the word "design" lays claim to a surprising portion of the world's contents. After all, what nature hasn't made for us, we've made for ourselves, designed the lot of it, in effect, even when we haven't realized we were doing anything as formal as that. The environment of our daily lives is a "made" world, and design is as common to it as air. Personal comment on design is pretty common too—those one or two irrepressible exclamations, for instance, when a child-resistant bottle cap turns out to be adult resistant as well.

The "National Design Triennial: Inside Design Now," a major exhibition currently at the Cooper-Hewitt, is a persuasive reminder of just how much is encompassed by "design." Eighty firms and designers are represented, and their contributions are, by turns, attractive, amusing, provocative, puzzling and visionary. Here, predictably, is the work of architects and interior and fashion designers—house plans and furniture, fabrics and wallpaper, clothing—but here as well are examples of advanced shoe and automotive design; magazine covers and book bindings; boxes to hold chocolates; a library of sometimes alarming bottled fragrances (not just madeleine but sushi, lettuce and riding crop); a bed of robotic flowers that are brought to life by the motion of a human hand; a measuring cup that can be read from above; a grapefruit-size plastic-and-titanium human replacement heart; and the startlingly beautiful model for an electric power plant whose vast field of three-inch-thick ceramic tiles may someday float off the coast of California and harvest energy from the ceaseless swells of the Pacific Ocean.

The *Dahlia* necklace was produced in the Netherlands in 1984.

The objects in the triennial exhibition are on loan only and will leave the Cooper-Hewitt at the end of January. But the museum has its own extraordinary collection of some 250,000 objects, dating back to the Han dynasty of 200 B.C., and most of them have never been seen by the public. Now, thanks to the generosity of trustee Nancy Marks and her late husband, Edwin, the Cooper-Hewitt will have, for the first time since it opened its doors in 1976, a permanent gallery in which to display its holdings. The newly renovated space, in what was once the music room of the Carnegie mansion, will reveal the range and beauty of the collections in two major installations a year.

Among the 150 items in the inaugural exhibition, opening in mid-October, are a blown-glass Roman bowl from the first century A.D., a large silk-velvet wall panel of exceptional color from 17th-century Persia, a Dutch-designed necklace from the 1980s—and a Sunbeam Mixmaster from the 1990s. That association of the rare and the ordinary across millennia may seem whimsical, but skill and imagination, qualities common to all the objects, keep their own calendar. In any era, the practical object can be pleasurable too, when it's well fashioned—but only if it has first been well designed.

Lawrence M. Small
SECRETARY OF THE SMITHSONIAN INSTITUTION

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Readers respond to the July issue:

UNCIVIL WAR

AH, THE APOTHEOSIZING of Dixie goes on ("Making Sense of Robert E. Lee"), and Roy Blount, Jr., does his bit: Lee, the butcher of the Confederacy, is "fiery," Stonewall Jackson "ferocious," Jeb Stuart "dashing." Ulysses S. Grant is dismissed as a "scruffy nemesis." The ugly reality is that the Confederacy was a brutal slave state. Articles like this contribute to its undeserved reputation as a gallant defender of lost causes.

JOHN PRAKSTA
ORELAND, PENNSYLVANIA

THE DENIGRATING article on Gen. Robert E. Lee is in poor taste. His story already has been written, largely by the victors, but even they could neither besmirch his sterling character nor his ability as a military giant. Lee is not just a Southern icon. His greatness has been attested by the significant and powerful all through subsequent history. Even your belittling of Lee's modesty will not detract from his greatness.

LEONARD WILSON
TOWNLEY, ALABAMA

LEE, THIS EPITOME of honor, had taken an oath when he graduated from the U.S. Military Academy at West Point and received his commission as an officer in the U.S. Army. At that time, he swore to "support the Constitution against all enemies foreign and domestic." What happened to that oath? What happened to his honor?

JOHN S. HOOLEY
MERRITT ISLAND, FLORIDA

ROBERT E. LEE was a great man, not because of his remarkable accomplishments as an engineer and general, but because of his magnanimity in seeking reconciliation and recovery after the Civil War. His later life is characterized by humility and altruism. Responding to a young mother's question regarding the key lessons she should teach her son, he said simply, "Madame, teach him he must deny himself." It wasn't until Ap-

pomattox that Lee fully lived up to the the wisdom of those words.

PHILIP BENHAM
HOLLIDAYSBURG, PENNSYLVANIA

WEST NILE VIRUS

"ON THE TRAIL of the West Nile Virus" was engaging and comprehensive but did not mention that, in addition to the blood-banking industry and the Red Cross, America's Blood Centers, a network of nonprofit community blood banks, continues to play a key role in the effort to protect the U.S. blood supply from the pathogen. The centers—which annually collect about 50 percent of the U.S. blood supply and 25 percent of the Canadian blood supply at more than 450 donation sites in 45 states and Quebec—have committed extensive resources to combating the risk of transmitting the disease through blood transfusions.

TONI GOULD
MICHIGAN COMMUNITY BLOOD CENTERS,
GRAND RAPIDS, MICHIGAN

CAPITALIST KOREA

IN "KOREA: A House Divided," Jonathan Kandell highlights the great economic and quality-of-life differences between the two Koreas. Indeed, the Koreas offer a stark difference in the failure of the Communist system versus the proper application of modern capitalism.

JEFF ROBERTS
ATLANTA, GEORGIA

PRESIDENT Eisenhower called for an armistice in 1953, but the U.N. had been seeking one since 1951. It occurred only after Soviet dictator Joseph Stalin, who had supported North Korea's invasion of South Korea and who pressed Chinese premier Mao Zedong to enter the war, died in March 1953. With Stalin out of the way, peace ensued quickly, but for U.S. Marines like me, not soon enough.

JACK ALLEN
PACIFIC PALISADES, CALIFORNIA

TOMATO WISDOM

AS A POSTSCRIPT to the essay "Haute Tomato," I offer the following from British humorist Miles Kington: Knowledge tells us that a tomato is a fruit; wisdom prevents us from putting it into a fruit salad.

HEINZ HELLIN
HAWKLEY, HAMPSHIRE, UNITED KINGDOM

Due to an editing error, "Riddles of the Anasazi" mischaracterized Arizona's Betatakin and Keet Seel cliff dwellings. According to the Arizona Tree-Ring Laboratory, they are the most recently inhabited sites in the region. —Ed.

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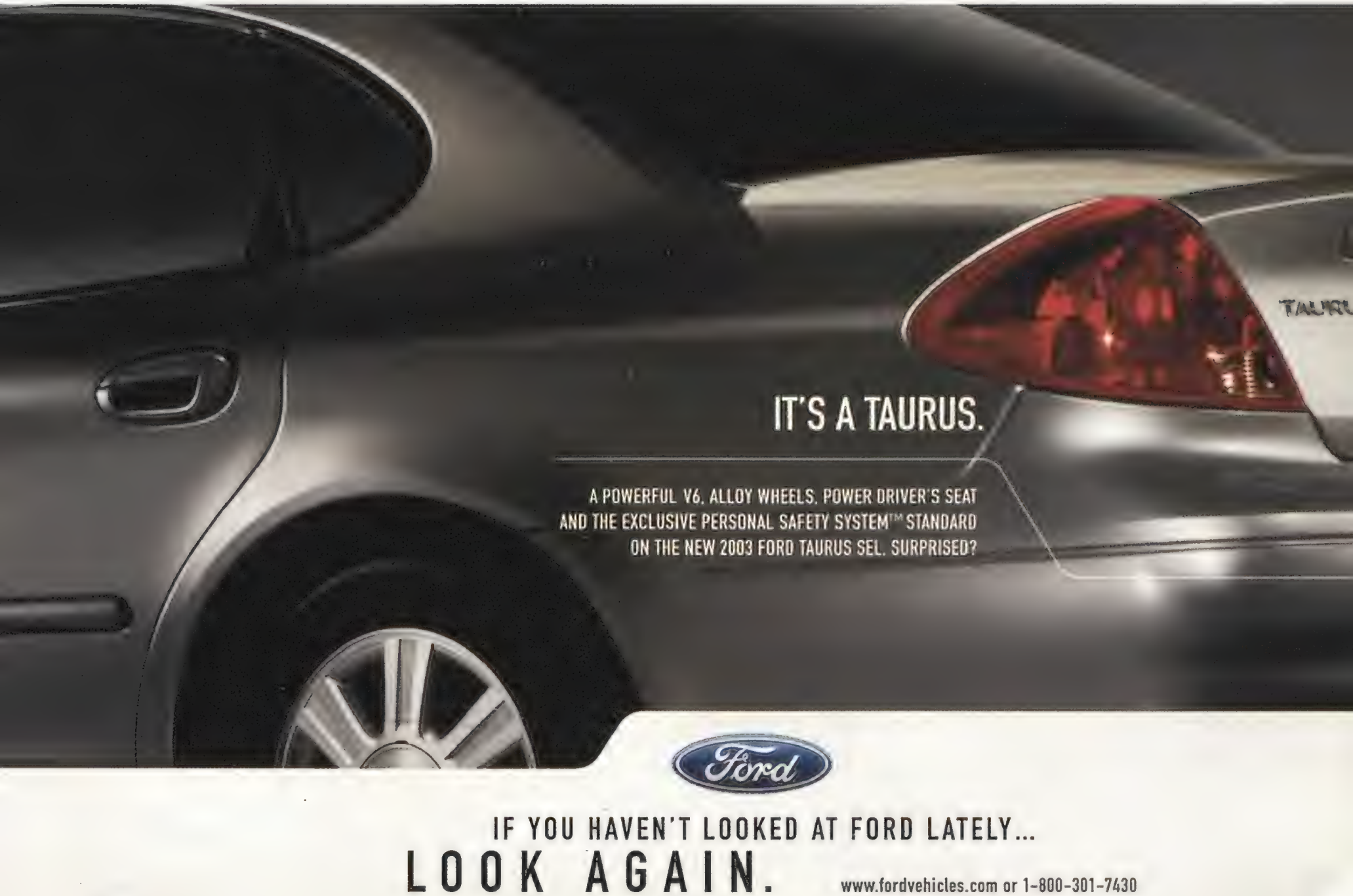
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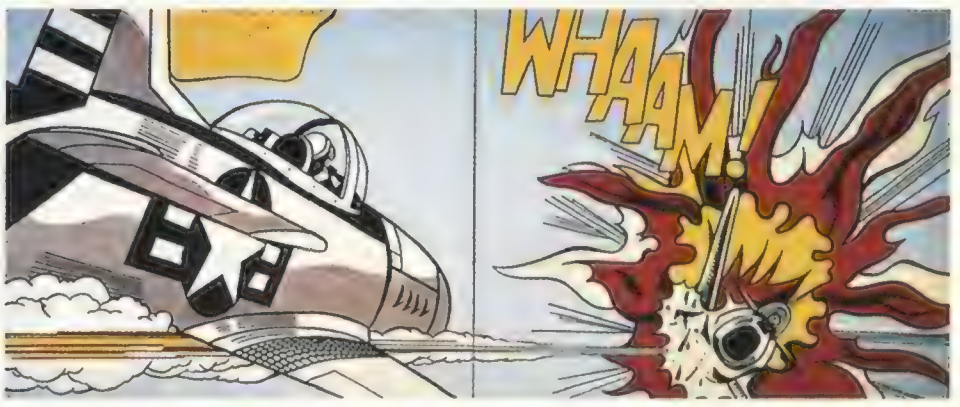
THIS MONTH IN HISTORY

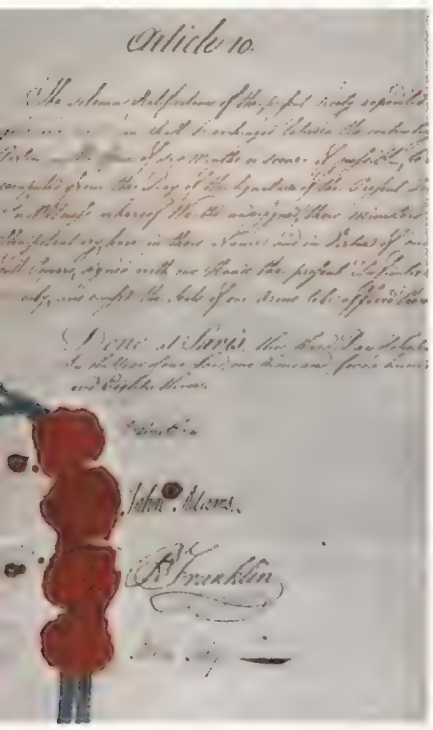
SEPTEMBER ANNIVERSARIES—MOMENTOUS OR MERELY MEMORABLE

230 YEARS AGO: "POETICAL TALENT"
The first book of poetry by an African-American is published, in England, in 1773. Among other themes, Phillis Wheatley, 19, a slave in Boston, insists that blacks are worthy of heaven: "Negroes black as Cain / May be refined, and join the angelic train." George Washington praises her "poetical talents." She dies in 1784, at age 30.

25 YEARS AGO: THE GREATEST ONCE AGAIN
On September 15, 1978, ninety million TV viewers see a rematch, in New Orleans, between aging legend Muhammad Ali, 36, and titleholder Leon Spinks, 25. In a unanimous decision, Ali wins the World Heavyweight Championship for a then-unprecedented third time. He will quit the ring in 1981, with 56 wins and five losses.



40 YEARS AGO: POP ART PARAGON
American Roy Lichtenstein elevates commercial imagery to fine art with *Whaam!*, a 5 1/2-by-13-foot painting first exhibited in New York City in 1963. He blasts convention by tackling a serious subject (war) in his signature comic-strip style. One critic bemoans the "triumph of the banal," but Lichtenstein is also hailed as a Pop prophet. He dies in 1997, at age 73.



220 YEARS AGO: LIBERTY!
America's independence from Great Britain is ensured on September 3, 1783, when English delegate David Hartley and Americans John Adams, Benjamin Franklin and John Jay sign a treaty in Paris, formally ending the Revolutionary War. The "perpetual peace" to which they agree will last all of 29 years—until the War of 1812.

130 YEARS AGO: HUNT AND PECK
The first typewriter with a QWERTY keyboard goes into mass production at the Remington gun factory in Ilion, New York, in 1873. By separating the most-used letters in the type basket, the design reduces jamming, boosts speed—and vexes typists to this day.

10 YEARS AGO: SHAKE ON IT
At the White House on September 13, 1993, Israeli prime minister Yitzhak Rabin and P.L.O. chairman Yasser Arafat finalize a "Declaration of Principles" providing for mutual recognition and limited Palestinian autonomy. The plan is modeled on the Camp David Accords (p. 56). O

—ALISON McLEAN

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Piccirillo isn't sure when she'll tell her son, Vaughan (with him September 11, 2001), about that awful day two years ago this month.

Brooklyn Rooftop, 9/11

Photographer Alex Webb captured a moment that showed, he says, the "continuity of life in the face of disaster" — BY PAUL MALISZEWSKI

ALEX WEBB AND JENNA PICCIRILLO were strangers when he photographed her with her 3-month-old son, Vaughan, on September 11, 2001. They were on the roof of the apartment building in which she was staying in Brooklyn Heights. Piccirillo, then 31 and a graduate student in interior design at the Pratt Institute in Brooklyn, was about to move to Long Island and had been on the roof only the night before to watch the sunset. "We took some video because the cityscape seemed especially magnificent as we were sort of saying our good-byes to the city and looking forward to our future in the suburbs," she recalls.

On the morning of the 11th, Piccirillo woke to a crack of what she supposed was thunder. When she opened her eyes to sunshine and blue sky, she thought it was going to be a "perfect day for a rainbow," she says. She carried Vaughan downstairs to a deli for her morning coffee. "The clerk and a customer were talking about the second plane hitting," Piccirillo remembers. She thought they were joking, but soon realized something horrible had indeed happened. "I wanted to see it," she says. "I grabbed hold of my son, I took my coffee, and climbed up to the roof."

A crowd was already gathering on the roof. "Not knowing what was going to happen next was terrifying," she remembers. "Was the world going to end?" People were trying to make cellphone calls, usually to no avail. Rumors circulated. Fears grew. People speculated wildly about the identity of the attackers. "The conversations were sort of background sound to me," Piccirillo says, recalling how she silently, raptly watched

ALEX WEBB / MAGNUM PHOTOS

Piccirillo says she was proud, not somber, to return to the roof.

Revisiting the rooftop with Piccirillo and son in May, Webb was struck by the boy's growth and energy. "September 11, 2001, seemed so long ago," the photographer says.

events unfold. A girl suggested the towers would crumble, but Piccirillo felt certain she was wrong.

Webb, a veteran photographer represented by the Magnum agency, and his wife, Rebecca Norris Webb, who is also a photographer, live in the Park Slope neighborhood of Brooklyn. At the time of the attacks, he was out buying groceries. He overheard passersby talking about a plane crashing into the World Trade Center. He ran home and turned on the television. He and Rebecca began packing their cameras.

The subway was shut down, so they rented a car and drove toward the Brooklyn Bridge, which was closed. They parked and continued on foot. A woman leaving an apartment building called out, asking if they wanted to see the city from the roof. They went up and found a crowd of people looking toward Manhattan. The Webbs took some pictures there and walked from rooftop to rooftop, looking for a vantage point. Then they saw Piccirillo. It was sometime after 11 a.m. when Webb took her picture. He says he was struck by the "sense of the continuity of life in the face of disaster."

The concentration of reporters, photographers and news organizations in New York City made the events of September 11 probably the most thoroughly covered catastrophe ever. Other photographs that Webb took that day would be published around the world, but the picture of Jenna and Vaughan would become his best known. One night Piccirillo was watching television with a friend. "Jenna," the friend said, "Look, it's you and Vaughan!" It was the first time she had seen the photograph. It has appeared many times since—on "60 Minutes II" and in *Time*, in newspapers and in books, in the United States and abroad. It was published in *New York September 11*, a book by Magnum photographers. Piccirillo is puzzled by her brush with media attention: "I think, my gosh, while I am grateful to have been coincidentally part of history, why *our* photo?"

Max Kozloff, a photographer and art critic, writes in the journal *Parnassus: Poetry in Review* that Webb's photograph of Piccirillo and son "displays a wonderfully incongruous tendency to show that life has its own purposes, independent of any scheme, and despite the heart-stopping urgency of the moment." Kozloff adds, "The focus on a local and tender episode renders the climactic event as hardly noticed background." Of course, as smoke and dust covered Lower Manhattan that morning, parents everywhere were paying special attention to their children. History is a tissue of such tender episodes, if also an imperfect record of them.

This past May, Piccirillo and Webb returned to the same roof for another photograph. Webb, 51, is best known for his enigmatic and often surprising reportage, particularly from Latin America and the Caribbean. He rarely returns to a place he has photographed and almost never "stages" a picture. "Most of what I do is about going and finding something," he says, "and in this instance I was bringing something to the situation." Piccirillo was proud and excited to go back, "not somber, as one might expect," she remembers.

Webb has authored five books.

Since their first, chance encounter, Webb has completed his fifth book, *Crossings: Photographs from the U.S.-Mexico Border*, to be published this fall. Vaughan is now 2 1/2, and Piccirillo works with a firm specializing in school architecture. They live in Patchogue, Long Island. She hasn't decided when she'll discuss the picture with Vaughan. "I have shown him the photograph, but I don't want him to know the details right now," she says. "I don't plan to shelter him forever, but for now this is what I do." ○

PAUL MALISZEWSKI's fiction has appeared in Pushcart *anthologies and the* Paris Review.

ALEX WEBB / MAGNUM PHOTOS; LARRY TOWELL / MAGNUM PHOTOS

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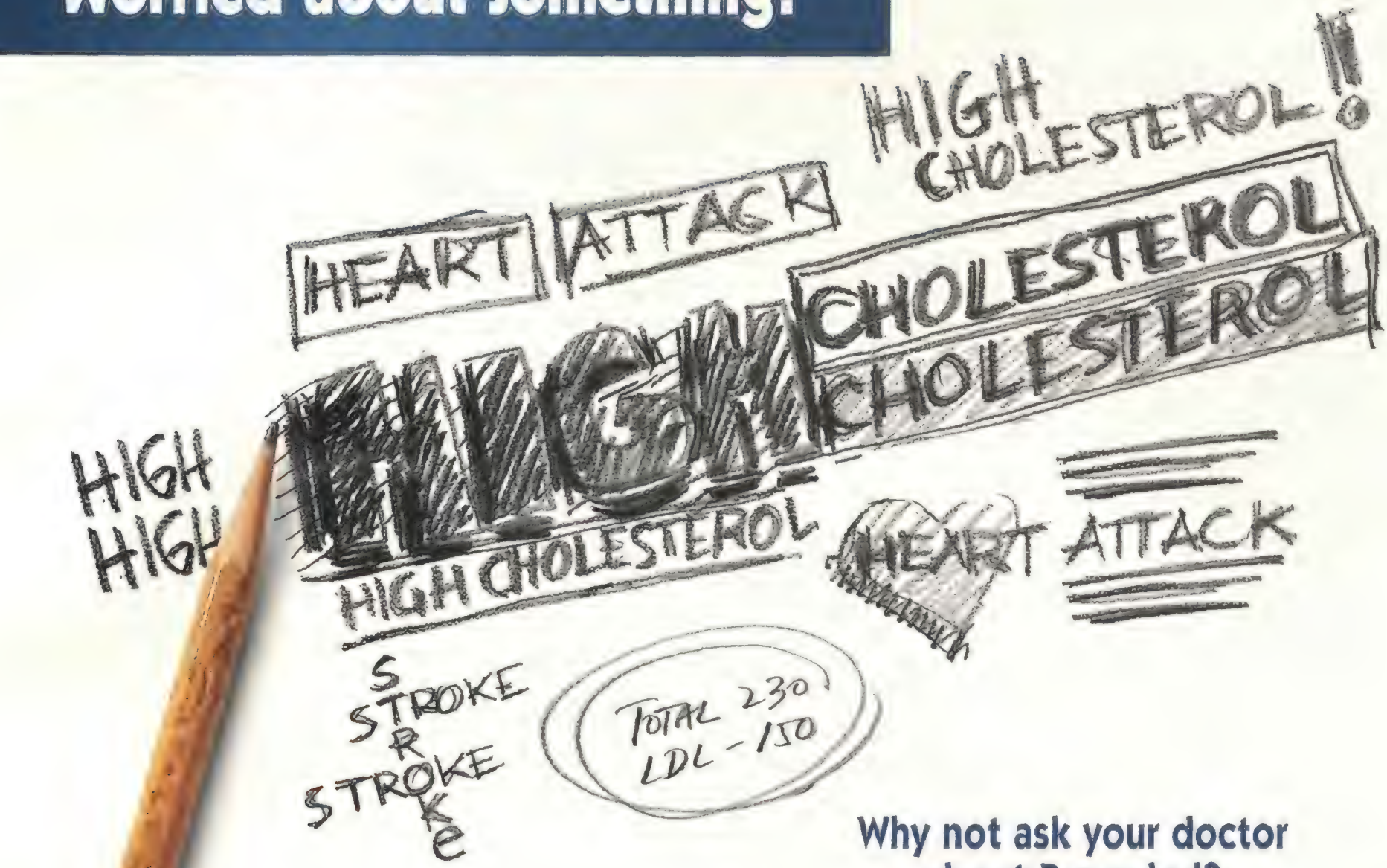

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- You can take PRAVACHOL with or without food.
- If you take too much PRAVACHOL, call your doctor or Poison Control Center right away.

Some people may need to stop taking PRAVACHOL completely, or for a long time (see **"What are the possible side effects of PRAVACHOL?"**).

What activities should I avoid while taking PRAVACHOL?

- **Do not get pregnant.** If you do, tell your doctor right away.
- **Do not breast feed your baby.**

What are the possible side effects of PRAVACHOL?

You should be aware of the following serious side effects:

- **Muscle damage:** Rarely, patients taking PRAVACHOL, have experienced serious muscle damage. If you have unexplained muscle pain or weakness while taking PRAVACHOL, **tell your doctor right away.** The following can be signs of serious muscle damage that can lead to kidney damage:
  - — muscle problems like weakness, tenderness, or pain that don't have a good reason for happening to you.
  - — a fever or you feel more tired than usual.
  - — passing brown or dark-colored urine.
- **Liver damage:** Rare cases of liver function abnormalities have been reported with PRAVACHOL. Your doctor may do blood tests to check your liver before you start taking PRAVACHOL, and while you take it.

Common side effects with PRAVACHOL are rash, upset stomach, muscle ache, and headache.

These are not all the possible side effects of PRAVACHOL. For more information, ask your doctor or pharmacist.

Talk to your doctor or pharmacist if you think you have side effects from taking PRAVACHOL.

General information about the safe and effective use of PRAVACHOL.

Do not use PRAVACHOL for a condition for which it was not prescribed. Do not give PRAVACHOL to other people, even if they have the same symptoms that you have. **Keep PRAVACHOL and all other medicines out of the reach of children.** This page summarizes the most important information about PRAVACHOL. If you would like more information talk with your doctor. You can ask your doctor or pharmacist for information about PRAVACHOL that is written for health professionals.

What are the ingredients of PRAVACHOL?

Active Ingredients:

The active ingredient in **PRAVACHOL** is pravastatin sodium.

Inactive Ingredients:

The inactive ingredients in **PRAVACHOL** are croscarmellose sodium, lactose, magnesium oxide, magnesium stearate, microcrystalline cellulose, and povidone. The 10 mg tablets also have Red Ferric Oxide; the 20 mg tablets and the 80 mg tablets also have Yellow Ferric Oxide; the 40 mg tablets also have Green Lake Blend (D&C Yellow No. 10-Aluminum Lake and FD&C Blue No. 1-Aluminum Lake).

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Issued June 2003

[*Billie Jean King's Tennis Dress, 1973*]
NATIONAL MUSEUM OF AMERICAN HISTORY

Dressed to Kill

In beating the pants off Bobby Riggs, Billie Jean King inspired feminists and fashionistas alike

BY ED LEIBOWITZ

IN THE DAYS leading up to Billie Jean King's monumental confrontation with self-proclaimed male chauvinist pig Bobby Riggs, the American public was spared few details about their $100,000, winner-take-all "Battle of the Sexes" tennis match, which took place 30 years ago this month. Newspaper readers knew that the 29-year-old King was wolfing down 3 Musketeers bars and vitamin E, while Riggs, 55, was devouring fistfuls of vitamins and bushels of avocados. They knew which theme songs had been chosen for the event: "Conquest," from an old Tyrone Power movie, for Riggs, while King's choice, "I am Woman," would be performed live by Helen Reddy. They even knew that heavyweight champion George Foreman would present the trophy to the winner, that Howard Cosell would deliver play-by-play and that Surrealist artist Salvador Dalí would be among the spectators seated in the VIP section of the Houston Astrodome.

Battle of the sexes: King made her point 30 years ago.

Riggs and King, however, remained curiously secretive about what they would wear. Riggs, the

SHINICHI TOKOYAMA / NATIONAL MUSEUM OF AMERICAN HISTORY, S.I.; BETTMANN / CORBIS

"Pigs Are Dead . . . Long Live the King," declared a post-match headline.

1939 Wimbledon champion turned tennis hustler, kept reporters guessing until he emerged on the day of the match in a yellow polo shirt proclaiming him the spectacle's "Sugar Daddy." When King's designer, legendary British tennis couturier Ted Tinling, touched down at New York City's Kennedy Airport with her attire, he refused to submit his bags for inspection, announcing to customs officials and press alike that his client would discard any outfit exposed to the light of day.

Once Tinling was spirited off to King's Houston hideaway, he opened his luggage to reveal a silk-lined dress of opalescent cellophane threads stitched onto nylon. Resplendent in the shimmering fabric, King "looked great in it," the designer wrote in his 1979 autobiography, "and we were both delighted." But moments later, Tinling recalled, "her expression changed."

Three decades later, King vividly remembers that abrupt shift in her mood: "When I saw it, I said, 'Oh great.' Then I tried it on, and I said, 'No, Ted, I can't wear it.'" The dress, says King, was "too scratchy." As she explained to Tinling: "I can't stand anything like that; it's gotta be very soft next to my skin." So the designer's daring yet abrasive masterpiece would be seen neither by the crowd of more than 30,000 in Houston nor by the tens of millions who would tune in to the match on national television and via satellite across 36 countries. The dress would vanish from view and even from Tinling's personal collection. (To this day, its whereabouts remain unknown.)

Instead, King chose to wear the designer's backup option—a menthol green and sky blue nylon number whose color scheme payed subtle homage to the fledgling Virginia Slims women's tennis tour, launched two years earlier. To both King's and Tinling's relief, she recalls, it "felt absolutely perfect when I put it on."

In the dress, on September 20, 1973, she crushed Riggs with her serve and volley game, winning the match 6-4, 6-3, 6-3. "Pigs Are Dead . . . Long Live the King," read a headline in the *Los Angeles Herald Examiner* the next day. No wonder the dress earned a place in the collections of the Smithsonian's National Museum of American History. While not Tinling's first choice, the dress, says curator Ellen Roney Hughes, "is still a pretty flashy item. You can see how Billie Jean dressed to take advantage of and enhance the publicity."

Tinling gets extra points for adding some eleventh-hour flash. Visiting the Astrodome, he worried that his creation might get lost in the glare of stadium spotlights, so, says Margaret Kirgin, a seamstress who worked with the designer until his death in 1990, "an editor of *World Tennis* [magazine] drove Mr. Tinling around Houston looking for rhinestones." On the morning of the match, the designer holed up in his hotel room, stitching rhinestones and sequins on the dress. "After that," Tinling wrote in his memoir, "I felt Cinderella Standby could really go to the ball."

During his career, Tinling would bring his perfectionist zeal to such clients as Rosie Casals, Chris Everett and Martina Navratilova. "He was very eccentric and very bright," says King. "You would notice him in a crowd because he was very tall. He had a bald head and was very thin, with very big hands."

Given the loaded symbolism of the Battle of the Sexes and King's own bitter memory of being excluded from a tournament group photograph at age 11 because, unable to afford a tennis dress, she was wearing a shirt and shorts, her choice of a posh Tinling creation was somewhat unexpected. King says she considered wearing shorts for the big match, but "I had gotten used to wearing dresses and I thought I looked better in dresses, actually."

History should note, however, that not for a moment did King contemplate facing Riggs in the reigning color of gender stereotypes. "I would never," she says, "have worn pink." ○

Despite the hijinks (King, left, Riggs, right), Billie Jean was dead serious: "I had the sense I was going to change tennis."

ED LEIBOWITZ, a freelancer based in Los Angeles, occasionally dabbles in tennis.

BETTMANN / CORBIS (2)

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Uncle Sam's Dolphins

In the Iraq war, highly trained cetaceans helped U.S. forces clear mines in Umm Qasr's harbor – BY WILLIAM GASPERINI

Navy dolphin K-Dog sports a "pinger" device that allows him to be tracked underwater.

ALL: BRIEN AHO / US NAVY

TWO WEEKS after the fall of Baghdad, U.S. Marine Corps Sgt. Andrew Garrett guides an inflatable boat through a cluster of American warships in the Persian Gulf off southern Kuwait. Beside him on a rubber mat lies one of the Iraq war's most unusual veterans, a 33-year-old male Atlantic bottle-nose dolphin named Kahili.

Garrett, 26, gently turns Kahili so that his tail is pointed overboard; the dolphin wiggles over the gunwales into the green water. The handler snaps a blue plastic lid off a beer-keg-size barrel of fish, holds it up for the dolphin to see and flings it like a Frisbee 50 feet out into the water. Kahili streaks, the disk disappears from the surface and, in seconds, Kahili explodes out of the sea next to the boat, the disk on his nose. Garrett grabs it and tosses a herring into the dolphin's mouth. "Kahili's one of our best," he says.

In March, Kahili, along with eight other dolphins that are a part of the U.S. Navy's Special Clearance Team One, became the first marine mammals to take part in mine-clearing operations in an active combat situation. Together with Navy SEALS, Marine Corps reconnaissance swimmers, explosive ordnance disposal divers and unmanned undersea vehicles, they helped disarm more than 100 antiship mines and underwater booby traps planted in Umm Qasr's port by Saddam Hussein's forces.

In fact, the team proved so effective that coalition forces were able to open Umm Qasr to ship traffic, including the British supply ship *Sir Galahad* loaded with rice and other foodstuffs, only a week after hostilities began. "Without the dolphins, we would probably still be out there trying to clear those waterways," says Garrett's colleague, Sgt. Scott Young, 29, who is also a dolphin handler.

In the war, Special Clearance Team One began mine-clearing operations by sending several unmanned sonar undersea vehicles to survey the port's seafloor. During up to 20-hour sweeps, these 80-pound, sonar-equipped drones—called REMUS, for Remote Environmental Monitoring UnitS—identified more than 200 suspicious submerged objects.

That's where the dolphins came in. Unlike REMUS, a dolphin can differentiate between natural and man-made objects using echolocation, a sensory system that involves transmitting sound waves at objects and reading the "echoes" that come back from them. They can even distinguish a BB pellet

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"We treat the animals with the utmost respect," says the Navy's Tom LaPuzza.

Navy handlers spray the dolphins continuously with water in transit (above) and when the mammals are transferred to inflatable boats (below) for mine-clearing missions.

from a kernel of corn at 50 feet.

A dolphin performs its sonar magic by generating high-frequency clicking sounds, which pass through the animal's rounded forehead (known as the melon), a fat-rich organ that serves as an acoustical lens and focuses the sound like a beam. "In the water it's like a buzzing or clicking sound, which you can feel when they swim up to you," says Garrett. "They're constantly checking you out." Sound bouncing off objects travels through the cavities of a dolphin's lower jaw to the inner ear, which transmits the information to the brain by way of the auditory nerve.

Remarkably, dolphins can change the wave form and frequency of the signals they send out, to gather more detailed information. "The animals can make these changes with incredible precision, in real time, just as they are receiving back the initial echoes," says Navy spokesperson Tom LaPuzza. "They're like the new video recording machines that can record and play back at the same time."

With survey results from REMUS in hand, teams composed of a dolphin, handler, trainer and boat operator motored out in inflatables to evaluate the

suspicious objects. When a dolphin discovered a mine, it would swim back to the boat's bow and nose an attached disk or ball. In most cases, the handler would then send the mammal back down to leave an acoustic transponder, which generated a pinging sound that divers would later use to locate and remove the mine.

The Navy says that the risk to dolphins in such operations is virtually nil because the animals are trained to stay a safe distance away from any mines they find. What's more, they say, sea mines are designed to explode only when a large metallic surface, such as the hull of a ship, passes nearby.

Still, the practice of using dolphins as mine sweepers has its critics. The Connecticut-based Cetacean Society International condemns the use of marine mammals in a combat zone. "Even wars have rules," society president William Rossiter said in a statement this spring. "It is evil, unethical and immoral to use innocents in war, because they cannot understand the purpose or the danger, their resistance is weak, and it is not their conflict."

"We treat the animals with the utmost respect," says LaPuzza. "We don't send them out to do anything that's dangerous for them." The Marine Mammal Commission, an independent federal agency, reported in 1989 that "Navy protocols for maintaining uniform standards of medical care and husbandry are excellent."

The Navy first began working with dolphins in 1960, when researchers at the Naval Ordnance Test Station facility at Pt. Mugu, California, sought to improve torpedo design by studying the animals' hydrodynamic efficiency. While the Navy learned little it could apply to torpedoes, Navy researchers did take note of the dolphins' intelligence, trainability and natural sonar. The researchers began to train dolphins to perform simple tasks underwater.

In 1965, a Navy-trained Atlantic bottle-nose named Tuffy dove 200 feet to carry tools and messages to crew members in SEALAB II off California's coast. In 1970, the presence of five Navy dolphins discouraged underwater saboteurs from entering the water and blowing up a U.S. Army pier in Vietnam's Cam Ranh Bay; in 1987 and 1988, five dolphins patrolled the waters around the USS *La Salle* off the coast of Bahrain.

Today, the U.S. Navy Marine Mammal Program at the Space and Naval Warfare Systems Center San Diego spends up to $14 million a year to operate, including training its 75 dolphins and 25 sea lions. The Navy says it hasn't captured wild dolphins since 1999, when it began a captive dolphin breeding program.

None of the sea mammals should expect a speedy discharge. "It's doubtful anything man-made will ever match the dolphins' capabilities," says LaPuzza. ○

WILLIAM GASPERINI, now based in Moscow, covered the Iraq war for the CBC.

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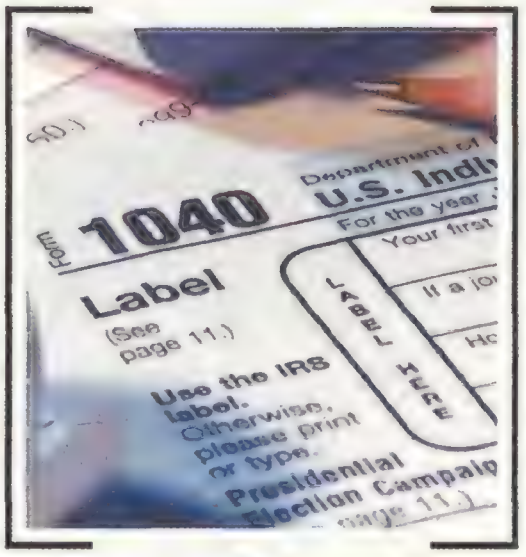

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RAISING A STINK One intrepid girl breaks from the crowd to sniff the 55-inch titan arum, or "corpse flower," that bloomed July 23 and 24 at the U.S. Botanic Garden in Washington, D.C. In those two days, 16,000 visitors came for a whiff of the 10-year-old plant, one of several of its kind displayed nationwide. Its notorious fragrance—likened to rotting flesh—attracts insects that carry the bloom's pollen to other arum flowers. The world's largest flower species, the titan arum can reach more than 18 feet and bloom several times in its 40-year life span. It was first discovered in 1878 in the Sumatran rain forests of Indonesia. Photograph by Walter P. Calahan. —*HELEN E. STARKWEATHER*

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Talking to Horses

Stanford Addison uses intuition, compassion and persistence to "break" wild horses ~ BY LISA JONES

Fifteen years ago, trainers using harsh, traditional methods tried for three months to break Chief (above); Addison succeeded in an hour. He was the first horse Addison "gentled."

IN THE MOVIE *The Horse Whisperer*, the mere sight of Robert Redford squatting thoughtfully in a meadow was enough to get a problem horse to shed its bad habits.

Stanford Addison gets horses to shed their bad habits all the time. But he doesn't squat. He's paralyzed. And though Addison is leery of being called a horse whisperer—a term "that's been used so much it's starting to sound phony," he says—he has a growing reputation as just that. Because he can't work the horses himself, he works through his students—his young Native American neighbors, and outsiders who come to him for instruction.

"Stan Addison has something special," says Mari Carlin Dart, a lifelong horsewoman who was a runner-up in the "pleasure driving" category of the 1981 Quarter Horse World Championship. "It's very organic and it comes from a very spiritual place, and that's something you don't see in the industry." His method, she says, is safer and more humane than traditional breaking—and it produces a happier horse.

On a hot, windy day in August, seven of us drove 7 hours from Boulder, Colorado, to Addison's place on central Wyoming's Wind River Reservation, which is home to the Northern Arapaho—Addison's tribe—as well as the Eastern Shoshone. Some members of our group planned to train horses under Addison's tutelage. The horses wouldn't emerge fully broken from the four-day clinic, but they would be "started"—introduced to saddle, bridle and rider.

We pulled up next to a corral by his house, a weathered, blue prefab three-bedroom surrounded by undulating

ALL: BRIAN SMALE

Addison saw that the best horsepeople are neither aggressive nor submissive. "If you're selfish, you disconnect, and if you give too much, you disconnect," he says. "If you're good to yourself and the horse, that's communication."

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After a while, the mare stood as alert and relaxed as a show horse.

plains of sagebrush, purple alfalfa and milkweed. Addison, 44, greeted us in an electric wheelchair, clad only in black socks and black nylon shorts. His limbs were slack and tanned. A black braid hung behind his upturned head. In a corral, a clutch of young, slender horses milled in the dust. They had spent their lives running free on the range. Until yesterday, that is. They moved restively, as flighty and fine-boned as caged birds.

Addison and his eight siblings grew up with horses. Like the white ranchers nearby, his father and grandfather broke horses brutally, letting them buck themselves to exhaustion, starving them or hobbling them—tying two legs together to hamper mobility and tire the animal. "It worked, but the hardest part was getting the horse to trust you again," says Addison.

Twenty-four years ago, Addison's life changed. A truck he was riding in ran into a group of horses on a reservation road. The truck rolled three times. When the police arrived, Addison was pinned underneath. The rescuers jacked up the truck, but it slipped, severing Addison's spinal cord. He was 20.

He spent two years in hospitals in Wyoming and Seattle. When he finally got home, he would wheel his chair up to the meanest, biggest guys he could find and antagonize them. "I wanted someone to murder me," he says. But his would-be killers wouldn't oblige. Instead, they tended to burst into tears and tell him their problems. "Something," he says in retrospect, "was up."

Addison and his brothers continued to break horses the old way. Then a quarter horse he was particularly fond of had an accident. "A cowboy tied one hind leg to the horse's neck, and the horse started throwing a tantrum. The other hind leg slipped on the mud, and the horse cracked its pelvis and couldn't get up," he says. "So we had to put it down. After that I tried a better way, to see what was lacking. And what was lacking was communication."

Addison saw that when a horse puts its ears forward or drops its head or licks its lips, it is open to communication from humans. He saw that a person who approaches a horse head-on frightens it more easily than someone who approaches from the side, with head down. He saw that the best horsepeople are neither aggressive nor submissive.

"If you're selfish, you disconnect, and if you give too much, you disconnect," he says. "If you're good to yourself and the horse, that's communication."

On the first morning of our clinic, Addison sat in a square of shade outside

Addison's method reassures a horse that it will not be hurt (using a piece of tarp, Mary Hogue acquaints a horse with touch).

a round corral. We were joined by a half-dozen or so young Native Americans who regularly come to Addison's to learn about horses and to be in his stabilizing presence. (As an example, Addison, divorced in 2001, is raising his ex-wife's two sons, 18 and 16, and an adopted daughter, 7.) He manages to tell jokes, field calls on a cordless phone and train horses all at the same time.

Paula McCaslin stood in the ring with a light gray Arabian mare who had led her Arapaho pursuers on a 30-mile chase two days before. Today, the mare kept trying to crawl under the corral fence. Addison spoke to McCaslin in short, repetitive sentences.

"Make her run," Addison said.

"Yah!" McCaslin hollered. "Yah!" The mare broke into a trot. Eventually, she stopped and, ears pricked forward, looked at McCaslin. "That's the kind of look you want," said Addison. "When she's ready to communicate, she'll drop her head." Sure enough, that's what the mare did. But as McCaslin approached, she turned away.

"OK, make her run," said Addison.

As the horse trotted past, he explained, "I'm making it so the horse can rest only when she's paying attention to Paula." He was satisfied with how it was going. "She's seeing that Paula's not in there to hurt her or threaten her," he said. "And she's a smart horse too; she's in there thinking."

Within an hour, McCaslin was stroking the wild mare. Next, she haltered the horse and clipped her to a "hang line," a rope threaded through a ring firmly attached to a cable strung tight about 12 feet above the corral.

This is the centerpiece of Addison's technique. The mare was tied just tightly enough that she could stand comfortably only when directly below the ring. If she stood off to the side—or reared, or otherwise resisted—the line pulled her head uncomfortably. The hang line had the added benefit of being far enough from the fence that she wouldn't hurt herself if she made a fuss. After some wrangling, she stood as alert and relaxed as a show horse.

Then McCaslin stroked her with a strip of tarp attached to a long pole. Addison explained that "tarping" prepares the horse for any human-caused movement—flapping raincoats and the like. The mare twitched at first, but soon got used to it. That done, McCaslin petted, leaned against, hugged and draped herself over the mare. Within three hours of picking the untamed mare out of the group in the holding corral, she was riding the horse.

I was so transfixed by the process, by how quickly that mare started to trust McCaslin, that I decided to train a horse too. I went into the corral, Addison rolling alongside me. Remembering that he's also a spiritual leader

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whose twice-weekly sweat lodges attract people from around the world, I was half expecting some shamanistic insight on which horse to choose. But he said only, "Which one do you want?" I pointed to a compact black stallion.

I picked him because he was beautiful. I also picked him because he was—as stallions go—small. I was scared. When I was 7, my mother bought a pony for me and my older sister. His name was Bobby. He had the body build of a big ball and the soul of a mercenary. Bobby had an affinity for a holly tree into which he deposited me with enough regularity that I still dream about it. We sold him when I was 9. Since then, I had ridden only half a dozen times—always on the oldest, slowest horse I could find. The black stallion read my past perfectly and proceeded to treat me with total disrespect.

"Make him run," said Addison, dragging on a cigarette from one of the two packs of Kool Filter Kings he smoked that day.

But the stallion ignored my "yahs," my claps and my attempts to slap him on the butt with the lead rope. He stopped. He turned his butt to me. He whinnied to his friends. I looked to Addison, but he was silent. Some 15 people watched. The stallion walked, stopped and occasionally broke into a desultory trot. I waved my arms at the horse and wished the ground would open up and swallow me whole.

"You're too accommodating," Addison called. "He's training *you* to run."

"I'm terrified," I called back. But Addison wasn't letting me off the hook.

"You'll do OK," he said.

At the side of the corral sat a rangy, silver-haired woman named Jeannie Ash, who had moved to Boulder after a car accident brought to a halt a 30-year career training ranch horses, show horses and riding horses in Nevada. She stood up gravely. "Yeah, let Jeannie give it a try," said Addison.

Ash climbed through the fence, drew herself to her full 5-foot-11 height, and slapped the ground with the lead rope as if she were Zeus and the rope a lightning bolt. All of us, including the stallion, snapped to. I faded to the side of the corral. Ash whacked the horse on the butt with the rope, and he started to run. Within a few minutes—his ears pricked forward with anticipation—he was looking at Ash while she stroked his nose.

"Your turn," said Addison.

I walked over. The stallion regarded me with considerably less enthusiasm than he had Ash, but he let me rub his nose. Miraculously, I put the halter on

"Horses show you about yourself," says Addison. His cousin, Weston Addison (above), teaches a horse to follow its rider.

him without incident.

We broke for the night.

The next day, things progressed more smoothly, and soon I was mounting the horse. Addison's directions took on the repetitive nature of a chant. "Do it again," he said every time the stallion flinched or spun. "Get back on," he said every time I got off.

The horse had to learn to accept me and that I wouldn't hurt him. I had already learned that nothing would dissuade Addison. The heat and the repetition bled away my internal arguments.

Let me say right here that only one of the 90 or so people Addison has talked through his process has suffered more than a rope burn, a bump on the rear end or a nip on the arm. That person was 14-year-old Annelise Bianchini of Boulder, who visited in the fall of 2002, got bucked off and sailed ten feet through the air before landing and briefly blacking out. ("I was scared," she said later, "and the horse got that.") Her mother, Sharon, watched as Addison sat with Annelise after the accident. Would she let her daughter do it again? "Oh yes," says Sharon. "No question."

Horsewoman Mari Carlin Dart is "incredibly impressed" by Addison's safety record. Still, "it's a dramatic-looking process," she says. "It's scary. Eleven hundred pounds goes straight up in the air when a horse gets scared."

Indeed. Back in the corral, I mounted the stallion and all hell broke loose. He reared up and was starting to fall over backward when I jumped off and landed on my feet. I said, "I'm not afraid of him anymore." At least that's what Ash said I said. I don't remember that, but I do remember what came next. Addison said, "Get back on him." And I did. A few minutes later, I rode the stallion for half a turn around the ring. It had taken me, all told, six hours to ride a wild horse.

I let him go in the corral, went to my tent and collapsed. Soon, Addison rolled up and said, "Your horse needs to be petted around and reassured some."

At the corral, the stallion's head hung. His eyes stared dully. Only then did I realize how exhausted he was, how terrified he'd been. I brushed him and hugged him and petted him.

As I stroked the little stallion back to life, I fell completely in love. We had been to hell and back together, without getting hurt. Later, I told Addison that if I could apply that level of faith and persistence to my human relationships, I'd have it made. He laughed. "Everybody is afraid to face their fears," he says. "And this puts you right in there where you have to use all the gifts that the Creator blessed you with. You get a better understanding of yourself." ○

LISA JONES lives in Colorado. She is writing a book about Stanford Addison.

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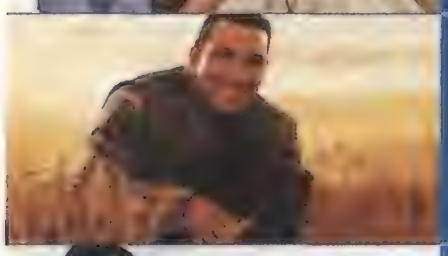 Seasonal Allergy Relief	✓	✓
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Rev. December 2002

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Shake Well Before Using

BRIEF SUMMARY

INDICATIONS AND USAGE

Nasacort AQ Nasal Spray is indicated for the treatment of the nasal symptoms of seasonal and perennial allergic rhinitis in adults and children 6 years of age and older.

CONTRAINDICATIONS

Hypersensitivity to any of the ingredients of this preparation contraindicates its use.

WARNINGS

The replacement of a systemic corticosteroid with a topical corticosteroid can be accompanied by signs of adrenal insufficiency and, in addition, some patients may experience symptoms of withdrawal; *e.g.*, joint and/or muscular pain, lassitude and depression. Patients previously treated for prolonged periods with systemic corticosteroids and transferred to topical corticosteroids should be carefully monitored for acute adrenal insufficiency in response to stress. In those patients who have asthma or other clinical conditions requiring long-term systemic corticosteroid treatment, too rapid a decrease in systemic corticosteroids may cause a severe exacerbation of their symptoms.

Children who are on immunosuppressant drugs are more susceptible to infections than healthy children. Chickenpox and measles, for example, can have a more serious or even fatal course in children on immunosuppressant doses of corticosteroids. In such children, or in adults who have not had these diseases, particular care should be taken to avoid exposure. If exposed, therapy with varicella-zoster immune globulin (VZIG) or pooled intravenous immunoglobulin (IVIG), as appropriate, may be indicated. If chickenpox develops, treatment with antiviral agents may be considered.

PRECAUTIONS

General: In clinical studies with triamcinolone acetonide nasal spray, the development of localized infections of the nose and pharynx with *Candida albicans* has rarely occurred. When such an infection develops it may require treatment with appropriate local or systemic therapy and discontinuance of treatment with **Nasacort AQ** Nasal Spray.

Nasacort AQ Nasal Spray should be used with caution, if at all, in patients with active or quiescent tuberculous infection of the respiratory tract or in patients with untreated fungal, bacterial, or systemic viral infections or ocular herpes simplex.

Because of the inhibitory effect of corticosteroids, in patients who have experienced recent nasal septal ulcers, nasal surgery, or trauma, a corticosteroid should be used with caution until healing has occurred. As with other nasally inhaled corticosteroids, nasal septal perforations have been reported in rare instances.

When used at excessive doses, systemic corticosteroid effects such as hypercorticism and adrenal suppression may appear. If such changes occur, **Nasacort AQ** Nasal Spray should be discontinued slowly, consistent with accepted procedures for discontinuing oral steroid therapy.

Information for Patients: Patients being treated with **Nasacort AQ** Nasal Spray should receive the following information and instructions. Patients who are on immunosuppressant doses of corticosteroids should be warned to avoid exposure to chickenpox or measles and, if exposed, to obtain medical advice.

Patients should use **Nasacort AQ** Nasal Spray at regular intervals since its effectiveness depends on its regular use. (See **DOSAGE AND ADMINISTRATION.**)

An improvement in some patient symptoms may be seen within the first day of treatment, and generally, it takes one week of treatment to reach maximum benefit. Initial assessment for response should be made during this time frame and periodically until the patient's symptoms are stabilized.

The patient should take the medication as directed and should not exceed the prescribed dosage. The patient should contact the physician if symptoms do not improve after three weeks, or if the condition worsens. Patients who experience recurrent episodes of epistaxis (nose bleeds) or nasal septum discomfort while taking this medication should contact their physician. For the proper use of this unit and to attain maximum improvement, the patient should read and follow the accompanying patient instructions carefully.

It is important to shake the bottle well before each use. **Also, the bottle should be discarded after 120 actuations since the amount of triamcinolone acetonide delivered thereafter per actuation may be substantially less than 55 mcg of drug.** Do not transfer any remaining suspension to another bottle.

Carcinogenesis, Mutagenesis, and Impairment Of Fertility: In a two-year study in rats, triamcinolone acetonide caused no treatment-related carcinogenicity at oral doses up to 1.0 mcg/kg (approximately 1/30 and 1/50 of the maximum recommended daily intranasal dose in adults and children on a mcg/m^2 basis, respectively). In a two-year study in mice, triamcinolone acetonide caused no treatment-related carcinogenicity at oral doses up to 3.0 mcg/kg (approximately 1/12 and 1/30 of the maximum recommended daily intranasal dose in adults and children on a mcg/m^2 basis, respectively).

No mutagenicity studies with triamcinolone acetonide have been performed.

In male and female rats, triamcinolone acetonide caused no change in pregnancy rate at oral doses up to 15.0 mcg/kg (approximately 1/2 of the maximum recommended daily intranasal dose in adults on a mcg/m^2 basis). Triamcinolone acetonide caused increased fetal resorptions and stillbirths and decreases in pup weight and survival at doses of 5.0 mcg/kg and above (approximately 1/5 of the maximum recommended daily intranasal dose in adults on a mcg/m^2 basis). At 1.0 mcg/kg (approximately 1/30 of the maximum recommended daily intranasal dose in adults on a mcg/m^2 basis), it did not induce the above mentioned effects.

Pregnancy: *Teratogenic Effects: Pregnancy Category C.* Triamcinolone acetonide was teratogenic in rats, rabbits, and monkeys. In rats, triamcinolone acetonide was teratogenic at inhalation doses of 20 mcg/kg and above (approximately 7/10 of the maximum recommended daily intranasal dose in adults on a mcg/m^2 basis). In rabbits, triamcinolone acetonide was teratogenic at inhalation doses of 20 mcg/kg and above (approximately 2 times the maximum recommended daily intranasal dose in adults on a mcg/m^2 basis). In monkeys, triamcinolone acetonide was teratogenic at an inhalation dose of 500 mcg/kg (approximately 37 times the maximum recommended daily intranasal dose in adults on a mcg/m^2 basis). Dose-related teratogenic effects in rats and rabbits included cleft palate and/or internal hydrocephaly and axial skeletal defects, whereas the effects observed in the monkey were cranial malformations.

There are no adequate and well-controlled studies in pregnant women. Therefore, triamcinolone acetonide should be used in pregnancy only if the potential benefit justifies the potential risk to the fetus. Since their introduction, experience with oral corticosteroids in pharmacologic as opposed to physiologic doses suggests that rodents are more prone to teratogenic effects from corticosteroids than humans. In addition, because there is a natural increase in glucocorticoid production during pregnancy, most women will require a lower exogenous corticosteroid dose and many will not need corticosteroid treatment during pregnancy.

Nonteratogenic Effects: Hypoadrenalism may occur in infants born of mothers receiving corticosteroids during pregnancy. Such infants should be carefully observed.

Nursing Mothers: It is not known whether triamcinolone acetonide is excreted in human milk. Because other corticosteroids are excreted in human milk, caution should be exercised when **Nasacort AQ** Nasal Spray is administered to nursing women.

Pediatric Use: Safety and effectiveness in pediatric patients below the age of 6 years have not been established.

Corticosteroids have been shown to cause growth suppression in children and teenagers, particularly with higher doses over extended periods. If a child or teenager on any corticosteroid appears to have growth suppression, the possibility that they are particularly sensitive to this effect of corticosteroids should be considered.

ADVERSE REACTIONS

In placebo-controlled, double-blind, and open-label clinical studies, 1483 adults and children 12 years and older received treatment with triamcinolone acetonide aqueous nasal spray. These patients were treated for an average duration of 51 days. In the controlled trials (2-5 weeks duration) from which the following adverse reaction data are derived, 1394 patients were treated with **Nasacort AQ** Nasal Spray for an average of 19 days. In a long-term, open-label study, 172 patients received treatment for an average duration of 286 days.

Adverse events occurring at an incidence of 2% or greater and more common among **Nasacort AQ**-treated patients than placebo-treated patients in controlled adult clinical trials were:

Adverse Events	Patients treated with 220 mcg triamcinolone acetonide (n=857) %	Vehicle Placebo (n=962) %
Pharyngitis	5.1	3.6
Epistaxis	2.7	0.8
Increase in cough	2.1	1.5

A total of 602 children 6 to 12 years of age were studied in 3 double-blind, placebo-controlled clinical trials. Of these, 172 received 110 mcg/day and 207 received 220 mcg/day of **Nasacort AQ** Nasal Spray for two, six, or twelve weeks. The longest average durations of treatment for patients receiving 110 mcg/day and 220 mcg/day were 76 days and 80 days, respectively. Only 1% of those patients treated with **Nasacort AQ** were discontinued due to adverse experiences. No patient receiving 110 mcg/day discontinued due to a serious adverse event and one patient receiving 220 mcg/day discontinued due to a serious event that was considered not drug related. Overall, these studies found the adverse experience profile for **Nasacort AQ** to be similar to placebo. A similar adverse event profile was observed in pediatric patients 6-12 years of age as compared to older children and adults with the exception of epistaxis which occurred in less than 2% of the pediatric patients studied.

Adverse events occurring at an incidence of 2% or greater and more common among adult patients treated with placebo than **Nasacort AQ** were: headache, and rhinitis. In children aged 6 to 12 years these events included: asthma, epistaxis, headache, infection, otitis media, sinusitis, and vomiting.

In clinical trials, nasal septum perforation was reported in one adult patient although relationship to **Nasacort AQ** Nasal Spray has not been established.

In the event of accidental overdose, an increased potential for these adverse experiences may be expected, but acute systemic adverse experiences are unlikely. (See **OVERDOSAGE.**)

DOSAGE AND ADMINISTRATION

Recommended Doses: *Adults and children 12 years of age and older:* The recommended starting and maximum dose is 220 mcg per day as two sprays in each nostril once daily.

Children 6 to 12 years of age: The recommended starting dose is 110 mcg per day given as one spray in each nostril once daily. The maximum recommended dose is 220 mcg per day as two sprays per nostril once daily.

Nasacort AQ Nasal Spray is not recommended for children under 6 years of age since adequate numbers of patients have not been studied in this age group.

Individualization of Dosage: It is always desirable to titrate an individual patient to the minimum effective dose to reduce the possibility of side effects. In adults, when the maximum benefit has been achieved and symptoms have been controlled, reducing the dose to 110 mcg per day (one spray in each nostril once a day) has been shown to be effective in maintaining control of the allergic rhinitis symptoms in patients who were initially controlled at 220 mcg/day.

In children six to twelve years of age, the recommended starting dose is 110 mcg per day given as one spray in each nostril once daily. The maximum recommended daily dose in children 6 to 12 years of age is 220 mcg per day (two sprays in each nostril once daily). Some patients who do not achieve maximum symptom control at a dose of 110 mcg per day may benefit from a dose of 220 mcg given as two sprays in each nostril once daily. The minimum effective dose should be used to ensure continued control of symptoms. Once symptoms are controlled, pediatric patients may be able to be maintained on 110 mcg per day (1 spray in each nostril once daily).

An improvement in some patient symptoms may be seen within the first day of treatment, and generally, it takes one week of treatment to reach maximum benefit. Initial assessment for response should be made during this time frame and periodically until the patient's symptoms are stabilized. If adequate relief of symptoms has not been obtained after 3 weeks of treatment, **Nasacort AQ** Nasal Spray should be discontinued. (See **WARNINGS, PRECAUTIONS, Information for Patients,** and **ADVERSE REACTIONS.**)

Directions For Use: Illustrated Patient's Instructions for use accompany each package of **Nasacort AQ** Nasal Spray.

OVERDOSAGE

Like any other nasally administered corticosteroid, acute overdosing is unlikely in view of the total amount of active ingredient present. In the event that the entire contents of the bottle were administered all at once, via either oral or nasal application, clinically significant systemic adverse events would most likely not result. The patient may experience some gastrointestinal upset.

Rx Only.

Please see product circular for full prescribing information.

Aventis Pharmaceuticals Inc.
Bridgewater, NJ 08807 USA

US Pat. Nos. 6,143,329 and 5,976,573.
Other patents pending.

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Rev. December 2002

nasaqb1202Aa

Meet Yorick, Man of Many Parts

A skeletal record of the invention of bionic body bits checks in at the Smithsonian

"HAVE YOU GOT YORICK'S HEAD?"

"Careful with those tubes!"

"There's something wrong with his toes."

Here at the loading dock of the National Museum of American History, the drama was more surreal than Shakespearean. A plastic skeleton dubbed Yorick sat buckled in the backseat of a Dodge RAM 250 van, while several museum staffers debated how to extract him without damage. There was little to do but summon the Bard: Alas! Poor Yorick.

"I knew him, Horatio—a fellow of infinite jest, of most excellent fancy," Hamlet told his friend, musing over the court jester's exhumed skull. Likewise, this bionic skeleton—bedecked with a gel-filled chin, an artificial tooth root and a single glass eye; with a pacemaker, a cranial plate and silicone finger joints; with dozens of screws, bolts and springs—is a fellow of most excellent fancy.

And of some historical significance. When the invention of artificial body parts expanded in the 1960s and '70s, the U.S. government realized it had to set up safety standards for the devices and investigate whenever a part failed. Yorick, outfitted with three decades' worth of such hardware, provides an important, if quirky, record of that time.

By the mid-1970s, Ed Mueller, then an engineer at the Food and Drug Administration (FDA) in Washington, D.C., had collected an array of ersatz parts. One day, as Mueller and his colleagues in the device-testing lab gathered around the coffeepot, somebody asked: "What should we do with these things?" The answer was obvious. In short order, Mueller purchased a medical school skeleton, and the bionic Yorick was born. "It was a lot better than sticking the devices in a drawer," says Mueller, who now teaches at the engineering school at Johns Hopkins University. Soon, Yorick had become an unofficial FDA mascot, appearing at schools, Cub Scout meetings and medical conventions—luring shutterbugs and wiseacres, as well as educating students about human anatomy, biomaterials and career opportunities.

At some point in Yorick's career, curators in the museum's division of Science, Medicine and Society got wind of him. "I always thought that when the time came, this would be an appropriate place for him," says museum specialist Judy Chelnick.

So, on a damp afternoon in June, Yorick's life on the road came to a close. Chelnick and her colleagues picked him up at the Washington Hilton, where he'd been attending a meeting of the American Society for Artificial Internal Organs, buckled him into a van and cradled his head as the van bounced along Washington, D.C. streets.

Yorick, the bionic skeleton (with museum specialist Judy Chelnick, left, and intern Devra Wexler), will join an American History Museum exhibition called "Inventing Ourselves."

CAMERON DAVIDSON

At the museum's loading dock, they eased him out of the vehicle, hooked him to a metal frame and rolled him up the loading ramp to a locked door. Chelnick pushed a buzzer, and she and Yorick were admitted to a brightly lit room lined with glass-front storage cabinets. There, amid the day's other treasures—a child's cart, a man's travel toiletries kit and a woman's rain bonnet—the skeleton was to be examined, photographed and assigned an accession number, joining the museum's other objects in a prestigious hereafter.

"It's good that Yorick rest in the Smithsonian," Mueller says. "He's done his duty." —*VICTORIA DAWSON*

FROM THE ATTIC

LIVING IT UP IN THE 1860s AT THE HOTEL SMITHSONIAN By day, these young men were serious scholars at the Institution. But at night they joined fellow members of the Megatherium Club, some of whom rented lodgings in the Castle, and the hijinks began. Using the imaginary call ("How! How!") of their namesake, an extinct ground sloth, they gathered over ale, oysters, eggnog and any other delicacies their meager incomes afforded. They ran sack races in the Castle's Great Hall and serenaded Secretary Joseph Henry's daughters. Robert Kennicott (standing, left), who would die while exploring Alaska in 1866, was "always bubbling over with fun," said one club member. Portrait artist Henry Ulke (standing, right) studied beetles. The leader, zoologist William Stimpson (seated, left), became director of the Chicago Academy of Sciences in 1867, and Henry Bryant (seated, right) was an ornithologist. All were protégés of Assistant Secretary Spencer Fullerton Baird, who occasionally admonished them for overindulging. The party ended in 1863 when Secretary Henry kicked out most of the lodgers; the club dissolved by 1866. Today, the Megatherium Club's spiritual heirs, now less rambunctious, include the pre- and post-doctoral fellows who work at field stations such as the Smithsonian Tropical Research Institute in Panama. —*BETH PY-LIEBERMAN*

HURRY IN

"The Splendor of Diamonds" closes at the National Museum of Natural History on September 15. The seven gems displayed—together for this one and only time—are among the rarest and most valuable diamonds in the world. The Allnatt (below, about twice its actual size) gets its golden hue from nitrogen impurities. At 101.29 carats, it is one of fewer than a dozen strongly colored diamonds weighing more than 100 carats.

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VISIT THE SMITHSONIAN For a free Associates' planning packet, call Smithsonian Information, 202-357-2700 or 202-357-1729 (TTY), 9 a.m.-5 p.m., Monday through Saturday, or send an e-mail to info@si.edu. **INFORMATION CENTER:** Upon arrival, stop at the Smithsonian Information Center in the Castle (9 a.m.-5:30 p.m.). Members are invited to drop by the reception desk (9 a.m.-4 p.m.) to register for a behind-the-scenes tour and to hear about membership benefits. Most museums are open daily, 10 a.m.-5:30 p.m., except December 25. **SUMMER HOURS:** The National Museum of Natural History is open until 7:30 p.m. daily through September 1. Thursday evening is Art Night on the Mall: the Hirshhorn Museum and Sculpture Garden and the National Museum of African Art are open until 8 p.m. on Thursday, August 28.

On October 16, 2002, Margaret Bowen held up a car wash and made a clean getaway.

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Although Lake Nyos appears placid, inhabitants of the region (including farmer Ephriam Che, right) know that lethal forces lurk in its depths. On August 21, 1986, some 1,800 villagers near its shores died in a mysterious mass asphyxiation.

Smithsonian
SEPTEMBER 2003 VOLUME 34, NUMBER 6

DEFUSING AFRICA'S KILLER LAKES

IN A REMOTE REGION OF CAMEROON, AN INTERNATIONAL TEAM OF SCIENTISTS TAKES EXTRAORDINARY STEPS TO PREVENT THE RECURRENCE OF A DEADLY NATURAL DISASTER BY KEVIN KRAJICK PHOTOGRAPHS BY LOUISE GUBB

ON THE NIGHT OF THE APOCALYPSE, Ephriam Che was in his mud-brick house on a cliff above Nyos, a crater lake in the volcanic highlands of northwest Cameroon. A half-moon lit the water and the hills and valleys beyond. Around 9 p.m., Che, a subsistence farmer with four children, heard a rumbling that sounded like a rockslide. Then a strange white mist rose from the lake. He told his children that it looked as if rain were on the way and went to bed, feeling ill.

Down below, near the lake's shore, Halima Suley, a cowherd, and her four children had retired for the night. She also heard the rumbling; it sounded, she would recall, like "the shouting of many voices." A great wind roared through her extended family's small compound of thatched huts, and she promptly passed out—"like a dead person," she says.

At first light, Che headed downhill. Nyos, normally crystal blue, had turned a dull red. When he reached the lake's sole outlet, a waterfall cascading down from a low spot in the shore, he found the falls to be, uncharacteristically, dry. At this moment he noticed the silence; even the usual morning chorus of songbirds and insects was absent. So frightened his knees were shaking, he ran farther along the lake. Then he heard shrieking. It was Suley, who, in a frenzy of grief and horror, had torn off her clothing. "Ephriam!" she cried. "Come here! Why are these people lying here? Why won't they move again?"

Che tried to look away: scattered about lay the bodies of Suley's children, 31 other members of her family and their 400 cattle. Suley kept trying to shake her lifeless father awake. "On that day there were no flies on the dead," says Che. The flies were dead too.

He ran on downhill, to the village of Lower Nyos. There, nearly every one of the village's 1,000 residents was dead, including his parents, siblings, uncles and aunts. "I myself, I was crying, crying, crying," he says. It was August 21, 1986—the end of the world, or so Che believed at the time.

All told, some 1,800 people perished at Lake Nyos. Many of the victims were found right where they'd normally be around 9 o'clock at night, suggesting they died on the spot. Bodies lay near cooking fires, clustered in doorways and in bed. Some people who had lain unconscious for more than a day finally awoke, saw their family members lying dead and then committed suicide.

Within days scientists from around the world converged on Nyos. At first, they assumed the long-dormant volcano under its crater had erupted, spewing out some kind of deadly fumes. Over months and years, however, the researchers uncovered a monstrous, far more insidious geologic disaster—one thought to exist only in myth. Even worse, they realized, the catastrophe could recur, at Nyos and at least one additional lake nearby. Since then, a small band of dedicated scientists has returned here repeatedly in an attempt to head off tragedy. Their methods, remarkably low-tech and inexpensive, may very well work. "We are anxious to protect the people there," says Gregory Tanyileke, a Cameroonian hydrologist who coordinates experts from Japan, the United States and Europe.

IT TOOK ME nearly 24 hours to fly from New York, via Paris, to Yaoundé, Cameroon's sprawling capital. There I met photographer Louise Gubb, but this was just the start of our journey. Most people in Cameroon, a poor equatorial country the size of California, are subsistence farmers, cultivating yams, beans and other staples by hand. In a nation with 200 or more ethnic groups, languages change every few miles. Islam, Christianity and animist cults mix and recombine in peaceful confusion.

After a 12-hour overland journey northwest from Yaoundé, we took the road to Lake Nyos, a washed-out dirt track winding through forested hills and passable only in a four-wheel drive vehicle. Electric power lines peter out at the dusty market town of Wum, 18 miles from the lake. As one approaches Nyos, grass grows in the road, indicating that few travelers come this way. After a final, mile-long climb through thinning bush, one emerges into an airy amphitheater of high cliffs carved into fantastical shapes surrounding the lake. At its north end, the crater's rim cants downward to a natural spillway, the waterfall Che found running dry that terrible morning. The lake is small, roughly half a square mile in area, now once again blue and tranquil. Black fishing eagles soar under a perfect sky. "Nyos," in the regional Mmen language, means "good," but in Itangikom, a related tongue, it means "to crush."

Freelance writer KEVIN KRAJICK, who lives in New York City, reports on science and the environment. Photographer LOUISE GUBB is based in Johannesburg, South Africa.

MIKE REAGAN

The proximity to the equator of Lakes Nyos and Monoun (see map, left) likely contributed to the catastrophic deaths at both locations. Because seasonal temperatures vary very little, layers of lake water failed to mix; deadly gases, trapped deep underwater, built up and exploded. At Nyos, the lethal emission (which killed both villagers and cattle, above) caused Cameroon's president, Paul Biya, to call for "scientific assistance to help us set up a mechanism that can warn people when such a leak is about to happen."

PETER TURNLEY / CORBIS (2); NEW YORK TIMES CO. REPRINTED WITH PERMISSION

York Times

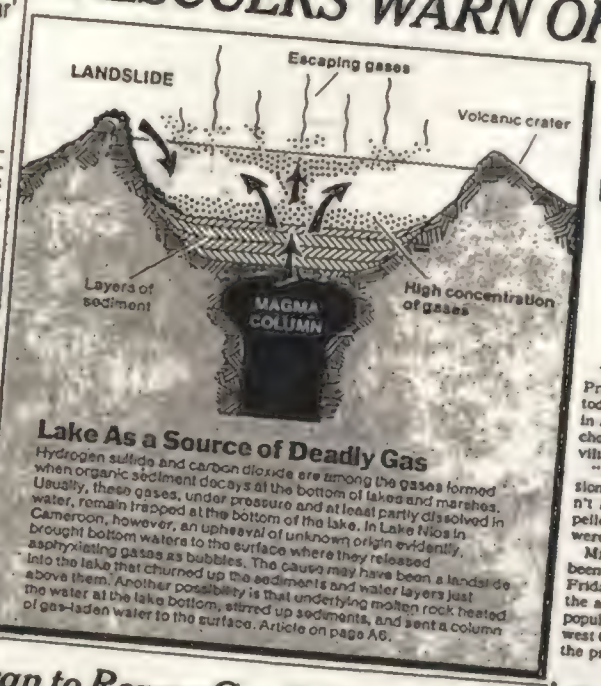
Late Edition

Weather: Partly sunny and warm today increasing cloudiness tonight. Mostl cloudy, chance of showers tomorrow Temperatures: today 80-83, tonight 67 70; yesterday 58-76. Details, page C18

TUESDAY, AUGUST 26, 1986

80 cents beyond 75 miles from New York City, except on Long Island. 30 CENTS

1,200 FEARED DEAD, 300 HURT IN CAMEROON GAS ERUPTION; RESCUERS WARN OF EPIDEMIC



Lake As a Source of Deadly Gas

Hydrogen sulfide and carbon dioxide are among the gases formed when organic sediment decays at the bottom of lakes and marshes. Usually, these gases, under pressure and at least partly dissolved in water, remain trapped at the bottom of the lake. In Lake Nios in Cameroon, however, an upheaval of unknown origin evidently brought bottom waters to the surface where they released asphyxiating gases as bubbles. The cause may have been a landslide into the lake that churned up the sediments and water layers just above them. Another possibility is that underlying molten rock heated the water at the lake bottom, stirred up sediments, and sent a column of gas-laden water to the surface. Article on page A6.

ACCESS IS DIFFICULT

President Says Villagers Died in Their Sleep — Air Remains Toxic

By THOMAS L. FRIEDMAN
Special to The New York Times

YAOUNDE, Cameroon, Aug. 25 — President Paul Biya of Cameroon said today that at least 1,200 people had died in a cloud of gas from a volcano that choked them to death as they slept in villages in northwest Cameroon.

"All people heard was the explosion," President Biya said. "They didn't know that toxic gas had been expelled, and it killed them while they were asleep."

Mr. Biya said that 300 people had been injured in the gas eruption last Friday, but that much was unclear in the area of Lake Nios, in the densely populated mountainous region of northwest Cameroon, about 30 miles north of the provincial capital of Bamenda.

Area Hard to Reach

The President voiced concern over the possibility of an epidemic from decomposing bodies in the remote area where the gas eruption occurred.

He said the continuing presence of toxic clouds made it difficult for army and police rescue workers to penetrate the afflicted area. Even in the best of times, it is hard to reach because of poor roads, and rainy weather frequently makes passage by land or air difficult.

Iran to Renew Gas Sales to Soviet; Pressure on Iraq Is Seen as Intent

By BERNARD GWERTZMAN
Special to The New York Times

WASHINGTON, Aug. 25 — Iran said today that it planned to resume exports of natural gas to the Soviet Union by the end of the year. The exports, ... broken off ... tries, such as France and the Soviet Union, that have been military suppli... ers to Iraq. This is ...

Local mythology suggests that people around Nyos have long been aware that the lake harbored destruction. Indeed, Cameroonian myths reserve a special category for lakes, which are said to be the homes of ancestors and spirits and sometimes a source of death. According to legends documented by anthropologist Eugenia Shanklin of the College of New Jersey, in Ewing, a lake may rise, sink, explode or even change locations. Certain ethnic groups decree that houses near lakes be erected on high ground, perhaps, in the collective memory, as a defense against disaster. Che's people, the Bafmen, have lived here for hundreds of years and followed that tradition: they settled Upper Nyos. About 60 years ago, other groups began moving into the area, and they did not necessarily follow long-standing custom. Suley and her family, for instance, who are Muslims (Che is Christian), are Fulani; they settled on Nyos' lower slopes. By the 1980s, the population near the lake was several thousand and growing fast. Even some Bafmen relocated down there.

Che, an energetic man who never seems to stop smiling, walked with me around Nyos' rim, telling a story he had learned from his grandfather. Long ago, the story went, a group of villagers decided to cross Lake Nyos. One man parted the waters, much as God parted the Red Sea for the Israelites, but a mosquito bit the man on a testicle; when he swatted the insect, he lost his grip on the waters and every villager was drowned. Che pointed toward the lake with the homemade spear he often carries. "They're between those two rocks," he said, referring matter-of-factly to the ghosts of that catastrophe. "You hear them talking sometimes, but you do not see them."

The story falls under the rubric of what anthropologist Shanklin calls "geomythology"—in this case, an account of an actual disaster that would become more fantastic as it passed down the generations, eventually fading into legend. "Details shift over time, but these stories probably preserve real events," Shanklin says.

ON AUGUST 15, 1984, two years before the catastrophe at Nyos, a strangely similar incident, albeit on a smaller scale, took place at Monoun, a bone-shaped crater lake about 60 miles south of Nyos. Monoun is located in a populous area, surrounded by farms and bordered in part by a road. Just before dawn, Abdo Nkanjouone, now 72, was biking northward to the village of Njindoun when he descended into a dip in the road. Parked along the road was a pickup truck belonging to a local Catholic priest, Louis Kureayap; Nkanjouone found the priest's dead body next to the truck. Moving on, he found another corpse, a man's body still astride a stalled motorcycle. "Some terrible accident has happened," thought Nkanjouone. Sinking into a kind of trance, he became too weak to bike and continued on foot. He passed a herd of dead sheep and other stalled vehicles whose occupants were dead. Beginning to climb uphill now, he encountered a friend, Adamou, walking toward him. He says he wanted to warn Adamou to turn back, but Nkanjouone had lost the capacity to speak. As though in a dream, he shook Adamou's hand silently, and the two continued in opposite directions. Nkanjouone made it into Njindoun alive. "God must have protected me," he says. Adamou and 36 others traveling that low stretch of road at the time did not survive.

Rumors about the disaster arose instantaneously. Some said that plotters attempting to mount a coup d'état, or perhaps the government itself, had carried out a chemical attack. Conspiracy theories abound in Cameroon, where unexplained events are often attributed to political intrigues. But a few officials looked to the local geology, theorizing that the long-dormant volcano under Lake Monoun had reactivated.

The U.S. embassy in Yaoundé called on Haraldur Sigurdsson, a volcanologist from the University of Rhode Island, to travel to Cameroon to investigate. Venturing out to the lake several months after the incident, Sigurdsson performed an array of analyses and found no signs of a volcanic eruption. He detected no indication of temperature increase in the water, no disturbance of the lake bed, no sulfur compounds. But a strange thing happened when he hauled a water-sample bottle from the lake depths: the lid popped off. The water, as it turned out, was loaded with carbon dioxide.

That curious finding prompted Sigurdsson's recognition that, indeed, the deaths around Lake Monoun appeared to be consistent with carbon dioxide asphyxiation. Carbon dioxide is a colorless, odorless gas heavier than air. It is the normal

Fearing another disaster, Cameroonian authorities removed to resettlement villages several thousand villagers (including this girl's parents) from the region surrounding Lake Nyos.

LOUISE GUBB / CORBIS SABA

Two years before the Nyos catastrophe, 37 people traveling along Lake Monoun's low-lying shoreline road (above) were also inexplicably asphyxiated. The road is still widely used.

by-product of human respiration and the burning of fossil fuels—probably the main culprit in global warming. But at high concentrations, CO_2 displaces oxygen. Air that is 5 percent carbon dioxide snuffs candles and car engines. A 10 percent carbon dioxide level causes people to hyperventilate, grow dizzy and eventually lapse into a coma. At 30 percent, people gasp and drop dead.

Carbon dioxide is also a natural by-product of geologic processes, the melting and cooling of rock. Most of the time it's harmless, surfacing and dispersing quickly from vents in the earth or from carbonated springs—think San Pellegrino water. Still, CO_2 poisonings have occurred in nature. Since Roman times, vented carbon dioxide in volcanic central Italy occasionally has killed animals or people who have wandered into topographic depressions where the heavy gas pools. At Yellowstone National Park, grizzly bears have met the same fate in a ravine known as Death Gulch.

Sigurdsson, after a few weeks, began to conclude that carbon dioxide from magma degassing deep under Lake Monoun had percolated up into the lake's bottom layers of water for years or centuries, creating a giant, hidden time bomb. The pent-up gas dissolved in the water, he believed, suddenly had exploded, releasing a wave of concentrated carbon dioxide. He wrote up his findings, calling the phenomenon "a hitherto unknown natural hazard" that could wipe out entire towns, and in 1986, a few months before the Nyos disaster, he submitted his study to *Science,* the prestigious U.S. journal. *Science* rejected the paper as far-fetched, and the theory remained unknown except to a few specialists. Then Lake Nyos blew up, killing 50 times more people than at Monoun.

WORD OF THE NYOS DISASTER spread quickly around the world. In Japan, a government official awakened Minoru Kusakabe of Okayama University at 1 a.m., inquiring if the geochemist would be willing to go at once to Cameroon. Kusakabe did not even know where the country was. French volcanologists; German, Italian, Swiss and British scientists; U.S. pathologists, geologists and chemists—all would converge on Nyos. Many departed from home so precipitously that they carried little more than a briefcase, a change of clothes and whatever scientific instruments they could grab. Among the Americans was limnologist (lake scientist) George Kling of the University of Michigan, who, as it happens, was making his second visit to the remote location. While studying the chemistry of Cameroonian lakes for his doctoral thesis the year before, he had sampled Nyos' waters from the shore because he didn't have access to a boat. The shallow water had yielded no hints of the dangerous gas in the depths. Now, a year later, the local

boy who had guided him along the lake was dead, along with nearly everyone else he had met. "I was numb," recalls Kling. "I had always dreamed of going back there, but not like this."

Arriving within days of the disaster, the scientists themselves were fearful; no one was sure what had just happened—or if it was about to happen again. The Cameroon military had buried human victims in mass graves. Thousands of cattle lay dead, their carcasses bloated and decomposing. Heavy rains fell. Only the survivors' hospitality alleviated the grimness. They took the researchers into their houses and cooked meals of corn mush over open fires. "Can you imagine that?" says Kling's research partner, geochemist Bill Evans of the U.S. Geological Survey. "These people had just lost everything, and *they* were worried about *us*."

The scientists motored out onto Nyos in inflatable dinghies to take water samples and look for clues. Once again, some assumed that an underwater volcano had erupted. But others immediately grasped that the villagers around Nyos had perished under the same conditions previously documented at Monoun—that Sigurdsson's "unknown natural hazard" was real.

Over ensuing weeks and months, scientists would piece together the Nyos story. The crater lake is extraordinarily deep (682 feet) and rests atop a porous, carrot-shaped deposit of volcanic rubble—a subaqueous pile of boulders and ash left from old eruptions. Carbon dioxide may remain from this old activity; or it could be forming now, in magma far below. Wherever it comes from, underwater springs apparently transport the gas upward and into the deep lake-bottom water. There, under pressure from the lake water above, the gas accumulates; pressure keeps the CO_2 from coalescing into bubbles, exactly as the cap on a seltzer bottle keeps soda from fizzing.

If the lake were farther north or south, seasonal temperature swings would mix the waters, preventing carbon dioxide buildup. Cold weather causes surface waters to become dense and sink, displacing lower layers upward; in spring, the process reverses. But in equatorial lakes like Nyos and Monoun, the deep layers seldom mix with top layers; indeed, the deepest layers may stagnate for centuries.

But something must have detonated the built-up carbon dioxide that August night 17 years ago. One theory is that boulders crashing into the lake (perhaps the rockslide Ephriam Che heard) set it off; the scientists at Nyos noted that an adjacent cliff face bore signs of a fresh rockslide. Or a fluky drop in air temperature, causing surface water to cool and abruptly sink, might have been the trigger, or a strong wind that set off a wave and mixed the layers. Whatever the cause, water saturated with carbon dioxide was displaced upward from the depths; as it rose and pressure lessened, dissolved carbon dioxide bubbled out of solution, and the bubbles drew more gas-laden water in their wake, and so on, until the lake exploded like a huge shaken seltzer bottle. (The explosion, they determined, had also brought up iron-rich water, which oxidized at the surface and turned the lake red.)

In addition, the scientists observed that a lakeside promontory had been stripped of vegetation to a height of 262 feet, presumably by a carbon dioxide-driven waterspout rocketing into the air. The explosion released a cloud of carbon dioxide—perhaps as much as a billion cubic yards, scientists estimate—that thundered over the lake's rim, hit Suley's family first and poured downhill at 45 miles per hour through two valleys and into the villages of Lower Nyos, Cha, Fang, Subum and, finally, Mashi, which is 14 miles from the lake.

Those on high ground survived. A few individuals at lower elevations, like Suley, were spared for no apparent reason. The only other survivor in her family was her husband, Abdoul Ahmadou. He had been away on business in Wum that night. When he returned, it was to join his wife in burying their dead, then to flee to a refugee camp near Wum. Amid fears that the lake could erupt again, the military ordered out most of the region's survivors, around 4,000 in all.

The scientists began making frequent return trips to Cameroon, not only to study both Nyos and Monoun but also to make the region safe for people wishing to return. Testing of the lake depths showed that the explosions had not cleared all the pent-up carbon dioxide; indeed, the gas was accumulating at alarming rates. The researchers speculated that certain layers

At Monoun, villagers (above left, in January) made offerings to lake spirits before scientists installed a pipe. At Nyos (below left, in January), researchers positioned monitoring equipment.

of Monoun, if left untouched, could become saturated with carbon dioxide by this year, and Nyos, sometime after. But either lake, even short of saturation, could explode at any moment.

The researchers considered various measures, such as blowing out the carbon dioxide by dropping bombs (too dangerous); dumping in massive quantities of lime in order to neutralize the gas (too expensive); or digging tunnels in the lake bed to drain the gas-laden bottom waters (*way* too expensive). In the end, they settled on a low-tech approach: running a pipe from the lake's deepest water layer to the surface, gradually releasing the gas to disperse quickly and harmlessly in the air. In theory, such a pipe, once primed, would carry the pressurized water from the depths and shoot it into the air like a natural geyser—a controlled explosion that could be sustained for years.

But not all researchers agreed that vent pipes would work. Geologist Samuel Freeth of the University of Wales, among others, speculated the process might set off a new explosion by spurting cold, dense bottom water onto the surface of the lake; the water would sink and create turbulence below. Even the researchers who advocated venting were worried, says Michel Halbwachs, an engineer from France's University of Savoy, who would design and install most of the equipment: "We were in an area [of science] little known and dangerous."

Using seed money from the European Union and private sources, a team headed by Halbwachs tested garden-hose-diameter pipes in Nyos and Monoun in 1990, then progressively larger pipes in 1992 and 1995. The experiment worked: the gas began venting. Halbwachs and coworkers were jubilant. Then the money ran out. The Cameroon government said it could not afford the $2 million to $3 million for permanent degassing installations. International aid agencies—more used to reacting to natural disasters than preventing them—did not grasp the concept. Kling, Kusakabe and others lobbied oil companies, governments and other organizations to pay for venting. Finally, in 1999, the U.S. Office of Foreign Disaster Assistance (OFDA) came up with $433,000 for a permanent pipe to be installed at Nyos.

By January 2001, the researchers had assembled rafts and piping at the site. Attached to a raft in the middle of the lake, a 5.7-inch-diameter pipe reached 666 feet to the deepest water layer. The Cameroon military provided emergency oxygen tanks for all workers in case of a rogue carbon dioxide release. After everyone retreated to distant high ground, Halbwachs pushed a remote-control button to activate a pump that primed the pipe. Within seconds a 148-foot spray shot into the sunlight at 100 miles per hour, and the small crowd let out a cheer. The degassing of Lake Nyos had begun.

But with 5,500 tons of carbon dioxide still pouring into the lake annually, one pipe barely keeps up; Kling and Evans estimate it may take more than 30 years before enough dissolved

At Nyos too, scientists are removing carbon dioxide from the lake. Because there are no funds for additional pipes to vent the gas more quickly, researchers still fear another explosion.

carbon dioxide can be vented to make the lake safe. Five pipes, the researchers say, might do the job within five or six years—but so far funding has not materialized. The venting of the lake cannot happen too quickly, as far as locals are concerned. Families have begun drifting back into nearby hills, siting their compounds in high passes but venturing down to the forbidden zone by day. "You can't keep people out forever," says Greg Tanyileke of Cameroon's Institute for Geological and Mining Research. "We need to go faster."

LAKE MONOUN sits in steamy low country, surrounded by dozens of miniature, dormant volcanic cones. The area was not evacuated after the disaster in 1984; the nearby village of Njindoun alone has 3,000 residents. Yet, as at Nyos, carbon dioxide levels have been building up for years. The U.S. OFDA and the French government have pledged money to vent the lake, and preparations for installing the first pipe were begun earlier this year, as I looked on this January.

Plans call for the installation of three pipes in Monoun, which could render the lake safe in only three years. The lake is smaller and shallower than Nyos, but continuing buildup had made Monoun more volatile. Some 210 feet down, carbon dioxide had reached 97 percent saturation. At that depth, says Kusakabe, if the layer were stirred up by only three feet, the water could start bubbling and trigger an explosion. His colleague, Bill Evans, advised caution: "Let's not go splashing around too much out there," he tells me.

Sections of pipe and other components were stacked by the lake and under military guard when photographer Louise Gubb and I arrived. A team headed by Kusakabe was eager to start, but locals made it clear that first it was necessary to contact the lake spirits. "Man can build machines, but machines can betray man," said Njindoun elder Mamar Ngouhou. "We must move slowly."

The next morning, a crowd assembled at the shore. Under a tree, several shamans stirred a blackish green paste in a ceremonial bowl and then, carrying cornstalks and an ancient wooden gong, led a solemn procession to the water. The head priest, Amadou Fakueoh Kouobouom, beat the gong while crying out to ancestors. On the lake, men in fishing canoes tossed offerings of fruit, salt and palm oil into the water. Kouobouom dipped his forefingers into the paste, and people lined up to lick it off. (The foreigners balked until a young man whispered, "This will prevent harm from coming to you on the lake.") Then came Muslim prayers; most villagers are also followers of Islam. A feast of rice and smoked fish ensued. Finally, a live ram was carried to the water; an Imam cut its throat and held the knife in the slit until the blood stopped flowing. Only after this four-hour ceremony was it time to proceed.

The Japanese technicians leaped up, wrenches and screwdrivers at the ready, and began fastening together two small rafts to support monitors and a vent pipe. A 15-man team wrestled the rafts into the water. Kling and Evans motored out in a dinghy and gingerly suspended instruments for measuring carbon dioxide and temperature. Later that day, the two American scientists drove to the spot where the first victims of the Monoun explosion had fallen. The team had installed a solar-powered carbon dioxide detector, equipped with a loud siren and marked with a hand-painted skull and crossbones sign and instructions to flee if the alarm sounded. They were pleased that it was still working. Three weeks later, engineers headed by Halbwachs finished installing the first pipe for Monoun. It has worked well so far.

THE COUNTRYSIDE around Lake Nyos was beautiful but eerie. At a nearby spring, one of several fed by deep lake waters, carbon dioxide bubbled up. A dead hawk lay in a mud puddle next to a dead mouse, both apparently asphyxiated. Out in the woods, white cattle appeared suddenly like ghosts, then melted into the bush silently, their owners nowhere to be seen. We slept on a lakeside promontory, millions of stars overhead, amid cricket songs and the barks of baboons. It was the dry season; farmers on the heights were torching the bush to prepare for planting. At night great rings of land-clearing fires burned above the lake.

One morning we visited what was left of Lower Nyos, now mostly impenetrable brush. Along the dirt road, the

Orphaned at age 12 in the Nyos disaster, Mercy Bih (now 29, with her son) has rebuilt her life. Today she owns a small restaurant in the market town of Wum, 18 miles from Lake Nyos.

foundations of a few mud-brick houses were still visible. Lines of trees marked the edges of what had once been yards. In the center of the former marketplace lay a large pile of rotting shoes. After the disaster, soldiers had buried the bodies in mass graves, whose locations were quickly lost in the rapidly revegetated bush country. That was a nearly unbearable loss: here, people routinely bury family members in the front yard so they can serve them meals, ask their advice and take comfort from their presence.

Survivors have overcome great challenges. On the day of the Nyos disaster, Mercy Bih was on her way to Wum, carrying about $100—a considerable sum in Cameroon—to buy supplies for her 26-member extended family. All her relatives were killed. She was 12. She returned the groceries and was reimbursed the $100, which she saved. Now 29 and the mother of two, she's the proprietor of the Lake Nyos Survival Good Faith Club, a four-table restaurant in Wum serving cold beer and the best grilled mackerel for miles. "I was lucky," she says. "Some people got left with nothing."

Though the Cameroon military had driven out most of those who had not fled the area on their own, Che, living on high ground, was allowed to remain, along with his wife and children, who had also survived. However, his uncle's seven children had been orphaned by the disaster, and tradition required Che to adopt them all, bringing his brood to 11. Che's income has been boosted by the foreign scientists working in the area, who pay him to measure lake levels and guard equipment, among other things.

Halima Suley (with daughter Nafih) and her husband—along with four other children born since they lost four children in the 1986 disaster—have resettled on high ground above Nyos.

As for Halima Suley, she and her husband now have five youngsters born to them since the tragedy. Just before dawn one morning, we hiked up to Suley and Ahmadou's new compound, located in a narrow pass above the lake. As a cooling breeze sprang up, we glimpsed thatched huts and cattle fencing coming into view. Out back, Ahmadou milked the cows; the herd numbers only 40 now. Suley greeted us in the family's perfectly swept yard with her children—from 15-year-old Ahmadou to 2-year-old Nafih. Suley made sweet tea with fresh milk and cradled the little one. "I'm no more thinking about the disaster," she says. "I have more children. I'm thinking about the children I have now." She smiled. "The only problem is a lack of cattle to feed them and to pay for them to go to school."

Ahmadou says, "If I think about what I was, what the family was, I can go crazy. So I try not to. We are believers. Your children can survive you, or you can survive your children—it is all in the hands of God." He says he appreciates the scientists' work. "When we feel their presence, we are much more peaceful, because we think something is being done." But, he admits, "When they leave, we live in fear." ○

There was no love lost between Egypt's Anwar Sadat and Israel's Menachem Begin. But at the very brink of failure, they found a way to reach agreement

BY BOB CULLEN

TWO WEEKS AT CAMP DAVID

SIXTY-TWO MILES northwest of the White House, not far from the bloodied soil of the Antietam and Gettysburg battlefields, lies a rocky hilltop shaded by oaks, poplars, hickory and ash. This 125-acre site in the Catoctin Mountains of northern Maryland, federal property since 1936, became a presidential retreat in 1942 under Franklin D. Roosevelt. He called it Shangri-La. The first foreign leader to visit was Winston Churchill, who in 1943 not only met with FDR and planned the Normandy invasion but also went fishing with him and, according to local lore, dropped in at a café in the nearby village of Thurmont, Maryland, for a beer and a jukebox tune. Truman made the cabins usable year-round by adding heat. Eisenhower renamed the place for his grandson, David, and installed a three-hole golf course. Kennedy put in a bridle trail and stable. Nixon added several guest lodges.

Then, 25 years ago this month, Camp David became the setting for an unprecedented episode of American diplomacy—and entered the lexicon as a near synonym for high-level peacemaking—when Jimmy Carter, Israeli prime minister Menachem Begin and Egyptian president Anwar El-Sadat gathered there for a tense and grueling 13 days. Of course, the United States had previously been the host of international peace conferences. In 1905, Theodore Roosevelt had mediated a settlement of the Russo-Japanese War, closeting diplomats from both sides in Portsmouth, New Hampshire, until they reached an agreement. But the Camp David summit was the first time a president met personally with foreign leaders on U.S. soil for the purpose of brokering peace between rival nations.

I was a young reporter in Washington at the time of the summit, covering diplomacy for the Associated Press. Recently, as the summit's anniversary approached, I surveyed the history and interviewed many of the surviving principals. What I learned left me with an enhanced appreciation of the difficulty of crafting peace in the Middle East generally and of the feat that Carter, Begin and Sadat finally achieved.

In the summer of 1978, the prospects for an Arab-Israeli settlement looked bleak. Sadat had journeyed to Jerusalem in November 1977 and pronounced his willingness to make peace. But the apparent breakthrough had proved chimerical. Sadat and Begin had failed utterly to reach agreement on the two major issues between them: the disposition of the Sinai Peninsula, which Israel had taken from Egypt in the Six-Day War of 1967 and Sadat wanted back, and the future of the West Bank and the Gaza Strip, both occupied by Israel since 1967. Sadat believed that Gaza and the West Bank belonged to the Palestinians. Begin always referred to those lands by their Biblical names, Judea and Samaria, and insisted that God had given them to the Jews.

"There was no compatibility between the two," Carter recalled of Begin (left) and Sadat (right) at the summit, the first time a president met with heads of state on U.S. soil to broker peace.

CORBIS

In July 1978, Carter met with his national security adviser, Zbigniew Brzezinski, to assess the problem. Brzezinski and Carter feared that a stalemate could degenerate into renewed warfare and believed that presidential mediation could overcome the history of bad personal chemistry between Begin and Sadat. "Who specifically popped up with the idea [of a Camp David summit] I am not prepared to argue," Brzezinski told me recently. "It was one of those conversations where there was a kind of spontaneous interaction."

ROBERT KNUDSEN / NIXON PRESIDENTIAL MATERIALS / NATIONAL ARCHIVES

Carter hoped Camp David (the president's quarters, Aspen Lodge, 1973) would relax the Egyptians and Israelis. But one delegate called it gloomy. Sadat likened the isolation to prison.

SADAT, THEN 59, was the son of a minor Egyptian civil servant and a Sudanese mother. He had been a fervent Egyptian nationalist, and as a youth he had expressed admiration for Hitler and Gandhi alike, seeing both as leaders trying to rescue their people from British oppression. Sadat, trained as a military officer, had spent time in Cairo prisons for conspiring with German intelligence agents against the British during World War II. He once acknowledged being involved in an act of terrorism, the assassination of an Egyptian politician who had favored continuing ties with Britain.

Sadat was also personally fastidious, and loved tailored clothing and expensive shoes. His writings are sprinkled with references to suits he had bought or coats that poverty had forced him to sell. At the age of 31, he placed an ad in a Cairo publication offering his services as an actor: "I go in for comic acting and I am ready to play any role in the theater or cinema." The ad failed; he rejoined the army in 1950. When his friend Col. Gamel Abdel Nasser launched a coup d'état in 1952, Sadat almost missed it. He was at the movies.

Sadat became one of Nasser's propagandists, then vice president. He rose to power after Nasser's unexpected death at age 52 in 1970. Once in command, Sadat displayed a tendency for taking risks. In 1973, he initiated war with Israel and regained the east side of the Suez Canal. In 1972, he expelled Soviet advisers from Egypt, signaling his desire to align himself with the West. And in 1977, he went to Jerusalem.

That gambit made Sadat an international news media darling, and he gave more than 100 interviews about his desire for peace. Only cynics noted that the move was not entirely altruistic. Earlier that year, riots shook Cairo after Sadat's government removed commodity subsidies, which caused consumer prices to jump. The army quelled the riots, but there were concerns that the military might turn against Sadat because Egypt's forces were in sharp decline following the withdrawal of Soviet support. Sadat needed a new patron, a new source of economic and military aid. To become an American client, he needed to offer peace to Israel.

Whatever his motives, Sadat had great charm. Brzezinski recalls him as "warm, gracious, even ingratiating." Carter said in a recent telephone interview that of all the foreign leaders he dealt with, Sadat was his favorite.

Begin's credentials as a peacemaker were as improbable as Sadat's. He was born in 1913 in the Polish city of Brest-Litovsk, then part of the Russian Empire. In later years he would say that his first memory was of a Polish soldier beating a Jew. Thin and frail, Begin studied law in Warsaw. But he never practiced. He was a disciple of Revisionist Zionism, a movement that advocated establishing a Jewish state immediately and not leaving the decision up to Britain, which, in 1922, had been given a mandate by the League of Nations to

"Oh, my God, this is group therapy, not negotiations," a U.S. official remembers thinking of Carter's presummit optimism.

oversee Palestine. The Zionist faction favored establishing the state either by settling an overwhelming number of Jews in Palestine or taking it by force.

In World War II, Begin reached Palestine as a soldier in a Polish Army detachment. His parents, a brother and other relatives all perished in the Holocaust. Begin was haunted by their memories. "The sighs of the condemned press in from afar and interrupt one's slumber," he once wrote, adding: "In these inescapable moments, every Jew in the country feels unwell because he is well."

Begin became the leader of a Jewish guerrilla group called Irgun Zvai Leumi. In 1944, he ordered the bombing of Jerusalem's King David Hotel, headquarters of the British military in Palestine. The explosion killed 91 people, among them 42 Arabs, 28 Britons and 17 Jews. He rejected allegations that the attack was terrorism; the hotel was a military target, he maintained, and the Irgun had phoned a warning to the British eight minutes before the bomb went off. Begin expressed regret only for the death of the 17 Jews.

The incident made Begin something of a pariah to Israel's founders. David Ben-Gurion, then the chairman of the Jewish Agency, a precursor of Israel's government, called the Irgun "dissidents and terrorists." After Israel achieved independence and Ben-Gurion became prime minister in 1949, he refused to refer to Begin by name, even after Begin had entered the Knesset, or Israeli parliament, as the leader of a small, right-wing party that same year.

Through seven failed campaigns for prime minister, Begin stuck to his Revisionist Zionism, which advocated a much larger homeland than that recognized by the United Nations in 1947 when it delineated Israel's borders. Begin's slogan after the 1967 war was "not one inch"—the amount of West Bank land he thought Israel should return to the Arabs.

Begin's political fortunes rose after a financial scandal involved leaders of the Labor Party in May 1977. He was by then leader of a right-wing coalition called Likud, which had won a national election, making him prime minister in June. Begin believed the majority of Palestinians in the West Bank and Gaza should be satisfied with limited autonomy under Israeli control. "He felt that Israel, with its sophisticated democratic philosophy, could . . . have a benign relationship [with the Palestinians]," Harold Saunders, assistant secretary of state for the Middle East at the time of Camp David, recalled to me.

"I don't think he ever met a Palestinian," Samuel Lewis, the U.S. ambassador to Israel from 1977 to 1985, said in an interview. "If he ever met one, he certainly never had much of a conversation with him."

BOB CULLEN, a former reporter for the Associated Press and Newsweek, *wrote last for these pages about St. Petersburg, Russia.*

CARTER, 53 at the time of Camp David, had a strong interest in the Middle East, rooted in his Baptist faith. Carter read a chapter from the Bible every evening (in Spanish), steeping himself in the region's history of conflict. Preparing for the summit, he referred in his notes to the possibility of the first peace between Egypt and the Jews in 2,600 years.

Within four months of taking office, the new president had held summit meetings with the leaders of Israel, Egypt, Jordan, Syria and Saudi Arabia. He had sounded them out about their opinions and sharpened his own. He thought that Israel, in exchange for peace, would have to give back the territory it had acquired in 1967, except for minor border modifications to enhance security. He spoke of a homeland, though not necessarily a state, for the Palestinians.

Carter hoped that Camp David's informal, sylvan setting would encourage the leaders and their delegations to mix, to see one another in human terms, to begin to trust each other, to compromise. Accordingly, Carter ordered that the attendees remain sequestered: the only news from the summit would come from daily briefings by Carter's press secretary, Jody Powell. "If you got into a situation in which both sides were playing to their constituencies back home, that would substantially diminish the chances of success," Powell recalled. "You'd get a dynamic where reporters are looking for the sexiest quote they can get, and one of the best ways to do that is to bait one side with a paraphrase or quote from someone on the other side. Before you know it, the public debate is escalating and people get themselves boxed in."

Though the White House spoke publicly of modest goals prior to the summit, privately Carter was more optimistic. William Quandt, then the National Security Council staff expert on the Middle East, recalls a meeting just before the summit began. "[Carter] said, 'What's going to happen is we'll be here about two or three days, and once Sadat and Begin realize their historic opportunity and once we isolate them from their domestic politics and the press and create the atmosphere for them to rise to this historic occasion, they're going to sit down and work out the principles on which peace will be done, and we'll announce it to the world.'"

To Quandt, that sounded naive. "I remember thinking to myself, Oh, my God, this is group therapy, not negotiations." Quandt might have been still more concerned about the prospects had he heard what the other two leaders were saying on the eve of the summit.

Sadat saw Camp David as the stage on which he would perform the feat of loosening the ties that bound the United States to Israel. "Sadat was convinced that it would all soon be over," Boutros Boutros-Ghali, then a diplomatic official in the Sadat government and later United Nations secretary-

general, would write in his 1997 memoir. "He would present his position. Israel would reject it. American public opinion would support Egypt. Carter would see that Egypt's position was good and Israel's was bad. The United States would then pressure Israel into acceptance of what Sadat had offered. It was simple."

Begin also saw the meeting as simple, but hardly in the way the Egyptian leader did. "We have a tough nut to crack," he told his delegation. "His name is Anwar Sadat."

FROM THE OUTSET, the summit did not unfold as Carter had hoped. The setting that seemed to him so restful and serene struck the desert dwellers of Egypt and Israel as dark and forbidding. "Camp David . . . has a somewhat claustrophobic feeling," Israeli defense minister Ezer Weizman later wrote. "The tall trees make the light gloomy, and one has to lift one's eyes to find a patch of blue sky." Nor did the informality help. Boutros-Ghali would recall his discomfort at seeing for the first time a head of state without a necktie.

The strain was most apparent in the main dining room. The Israeli delegation sat together in one section of the hall, the Egyptians in another section. The Americans tried to bridge the gap, but as Weizman wrote, "the atmosphere remained oppressive and tense." Only years later did Boutros-Ghali disclose that the Egyptians were under orders from Foreign Minister Muhammad Ibrahim Kamel not to socialize with the Israelis.

The negotiations began no more auspiciously. Carter met first with Begin and suggested that Sadat would not sign an agreement unless Israel recognized the principle that territory cannot be acquired by force. Begin replied that such a principle would not pertain to the war Israel had fought in 1967. In other words, he recognized no obligation to give back any of the territory Israel acquired in that conflict. Carter was disappointed. "Begin's boilerplate positions had not been discernibly modified," he wrote.

Carter finally brought Begin and Sadat together on the afternoon of the summit's second day. Begin listened frostily to Sadat's opening position. When he got back to the Israeli delegation, he described his reaction to it with a Yiddish term: "What chutzpah!"

The next day, Begin rejected Sadat's proposal point by point. He dismissed the requirement that Israel withdraw from virtually all of the West Bank and Gaza, adding that Sadat must allow Israel to retain the 13 settlements it had established on Egyptian territory in the Sinai. Sadat pounded the table. "Security, yes! Land, no!" he shouted.

"There was no compatibility between the two," Carter wrote later. "Almost every discussion of any subject deteriorated into an unproductive argument."

The press was bivouacked in an American Legion Hall in Thurmont. Powell put the best spin on things. "I am not in a position to characterize [the talks] or go into [their] substance," he told reporters. "It is my impression that the personal relationships among all three principals are good."

After their first meeting at the summit, Carter (far left) wondered if Begin (far right, with, from left, Defense Minister Weizman; Begin's wife, Aliza; Yehiel Kadeshi, an adviser; and spokesman Dan Patir) truly wanted peace.

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When Begin told his delegation that Carter's views were close to Sadat's, the Israelis were apprehensive. "It won't be long before we're on our way home," Weizman thought.

Carter met with Sadat the next morning. The Egyptian president presented a proposal that Begin could never accept. It called on Israel not only to withdraw from lands captured in 1967 but also to pay for past use of the territory. Then Sadat did an odd thing. He handed Carter three pages of concessions he was prepared to make, backing away from the formal proposal he had just laid down. He asked Carter to keep the concessions private until he felt it was time to use them. Then he went back to his lodge and watched Alex Haley's "Roots" on TV.

Sadat's ploy "wasn't all that stupid," Brzezinski recalled. "It was an effort to get Carter committed, to make Carter, in a sense, his lawyer."

In reality, the summit was on the verge of breaking down. Aharon Barak, then a legal expert with the Israeli delegation, asked Quandt to get a message to Carter requesting that he not bring Sadat and Begin together again. Barak said Begin was hardening his position and thinking of ways to leave Camp David without being blamed for the summit's failure.

Lewis recalls a conversation he had with Carter as they walked in the woods after a particularly frustrating meeting. "Sam, I don't think Begin wants peace," Lewis remembers the president saying. "I don't think Begin wants peace at all."

Lewis, a career diplomat, believed that nations generally do want peace. The conflict, he told the president, was over

Nerves were frayed. At 4:14 in the morning, Carter called Brzezinski and said he was worried about Sadat's security.

the conditions for achieving it, the risks and compromises that leaders were prepared to accept. In that respect, Lewis said, Israel was no different from other nations.

"Well, no," Carter said. "I don't think they really want peace."

Carter had to improvise. With Plan A—the brief meeting that would produce warm personal feelings between Sadat and Begin—in shambles, he fell back on Plan B. He would take Barak's advice and keep Begin and Sadat separated. He would hold what diplomats call "proximity talks," in which leaders are in the same location but do not talk directly. The Americans would shuttle proposals between them. One proposal—outlining concessions by both sides—had been developed weeks before by Secretary of State Cyrus Vance, Saunders, Quandt and Ambassador Alfred "Roy" Atherton, Jr., a roving envoy for the Middle East. Now the American staff reworked the proposal.

On the sixth day of the summit, a Sunday, Carter showed the revised American plan to the Israelis. The meeting did not go well. A mention of the national rights of the Palestinians was "out of the question," Begin said. So was a proposal that Israel dismantle its Sinai settlements. "We do not dismantle settlements," Begin declared. As to the proposed wording that acquiring territory by war was inadmissible, Begin said, "We will not accept that."

"You will have to accept it," Carter said.

"Mr. President, no threats, please."

Carter persisted, making more changes in the U.S. proposal—there would eventually be 23 drafts—and showing the new version to Sadat the next day. Sadat was severely disappointed. He went back to his lodge and told his advisers that thanks to Begin's intransigence, he would withdraw from the talks and leave Camp David the next day.

Meanwhile, down in Thurmont, Powell was finding it more and more difficult to steer reporters away from stories that the summit was about to end in failure. Barry Schweid of the Associated Press reported that the talks were stalemated, despite "gigantic" efforts by Carter to get concessions from Begin. "It is correct that the president has been making gigantic efforts generally," Powell said when reporters sought his comment. "Beyond that, if I were an editor, I would be leery of making that a front-page story." But the story flashed around the world. And it was accurate.

FACED ONCE AGAIN with disaster, Carter made two decisions that would prove critical. He "decoupled" proposals covering the Sinai from ones covering the West Bank and Gaza. Previously, those problem areas had been viewed as linked. The move essentially separated Israeli-Egyptian disputes from Israeli-Palestinian disputes. For the Israelis, it raised the prospect that they could get peace and recognition from Egypt without jeopardizing their plans for the West Bank. Carter also began to rely heavily on the pragmatic Barak as an interlocutor. Barak, now chief justice of Israel's Supreme Court, enjoyed Begin's confidence. Carter convened a committee composed of himself, Barak and Osama al-Baz, Egypt's under secretary for foreign affairs. For almost the entire ninth day of the summit, the three men laboriously pored over drafts of the proposed agreement.

Slowly, they made progress. Carter agreed to drop language about the "inadmissibility of the acquisition of territory by war" from the main text of the agreement while Barak persuaded Begin to permit similar language, based on United Nations Security Council Resolution 242, in the preamble. Still, the talks threatened to break down, primarily because Begin insisted that Israel keep its Sinai settlements. "My right eye will fall out, my right hand will fall off before I ever agree to the dismantling of a single Jewish settlement," Begin told Brzezinski during a morning walk. Nor would he agree to a freeze on settlements in the West Bank.

Nerves were frayed. At 4:14 on the morning of the tenth day, Carter called Brzezinski and said he was worried about Sadat's security. He was afraid that word of the concessions Sadat had made would leak out and prompt Palestinian terrorists to assassinate him. Carter ordered the security around Sadat's lodge strengthened.

Sadat was showing signs of emotional distress. In a meeting with his staff later that day, he erupted at their criticism of the deal Carter was maneuvering toward. "What can I do? My foreign minister thinks I'm an idiot!" he shouted. He ordered them to leave the room. Later, he apologized to Kamel for losing his temper. "It's the fault of this accursed prison we find ourselves in," he said.

On the 11th day, with Begin still holding firm on the Sinai settlements, Sadat asked Vance to arrange transportation home for the Egyptian delegation. Alarmed, Carter went to Sadat's lodge, spoke with him for 29 minutes and persuaded him to stay. After that, Sadat turned curiously passive, according to his aides. "I shall sign anything proposed by President Carter without reading it," he said at one point.

But even Carter was losing hope. He instructed Quandt to begin drafting a speech to be delivered to the American people, explaining why the summit had failed. Quandt did so, laying most of the blame at Begin's feet.

How much of that Begin knew is a matter of conjecture; he never wrote his memoirs. But with peace between Israel and Egypt in sight, some in his delegation had been working to persuade him to yield ground on the Sinai. An aide arranged for Begin to phone Ariel Sharon, who is currently prime minister but then served as minister of agriculture and represented the pro-settlements forces in Likud. Sharon told

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Sadat's foreign minister, Ibrahim Kamel, resisted many of the compromises and resigned in protest before the summit ended.

Begin he would not object to dismantling the Sinai settlements if it meant a peace with Egypt.

Finally, on the 12th day, Begin budged. He told Carter he would let the Knesset vote on whether to dismantle the Sinai settlements. With that, the Camp David accords hove into view. To be sure, they were not a full-fledged treaty, which is legally binding, but rather statements of principles that would govern future negotiations. Still, Egypt would get back the Sinai. Israel would get a peace treaty and diplomatic recognition. For the West Bank and Gaza, there would be a plan for autonomy negotiations, followed, in five years, by a decision about their final status.

"Breakthrough," Carter recalls thinking.

At first unyielding, Sadat (second from left) surprised Carter with concessions that eased agreement but outraged Kamel (back to camera, with, at left, al-Baz and Deputy Prime Minister Mohammad Al Tohami).

BUT THE EXHAUSTED PRESIDENT and his aides still had the endgame to play. Vance and Carter met with Begin, Israel's foreign minister Moshe Dayan and Barak until after midnight of the 12th day. Only Barak and Dayan took notes. Carter pressed Begin for a letter promising a freeze on building new settlements in the West Bank during the period of negotiations over the West Bank and Gaza. Begin said something that Carter took as agreement.

Quandt, who was sitting in an anteroom, remembers Vance coming out as the meeting broke up. "What have you got?" Quandt asked.

"I think we've got an agreement, but I'm not quite sure on the settlements," Vance replied.

The next morning, day 13, Begin sent Carter a letter saying the freeze on new settlements would last only until negotiations over the Egyptian-Israeli treaty were concluded, expected to be only a few months. Carter rejected the letter. But Begin held fast, and eventually Carter, rather than jeopardize the agreement, decided to sign the accords with the settlement issue unresolved. He eventually dropped the issue.

At about 5:30 that afternoon, Carter performed his last act of mediation, persuading Begin not to visit Sadat to congratulate him on the conclusion of the talks. Carter sensed that their animosity was so strong that even a brief encounter might undo everything. After Begin agreed, Vance turned to Carter. "That's it," he told the president. "I think you have it." Carter sat in a chair, looking tired, smiling wistfully. No one cheered. Everyone in the room knew that the success the president had achieved was imperfect, with compromise language papering over many disagreements.

The parties left Camp David, and the three leaders formally signed the documents that evening in a televised ceremony in the White House. Even so, only part of the peace envisioned at Camp David came to fruition in the months that followed. Egypt and Israel eventually agreed to a peace treaty, although it took many more months of negotiations than the three leaders had anticipated. Israel withdrew from the Sinai on schedule. Three months after Camp David, it was announced that Begin and Sadat would share the Nobel Peace Prize.

IN RETURN for getting Egypt's land back, Sadat got obloquy in the Arab world. His foreign minister, Kamel, had resigned in protest just before the summit ended and refused to attend the signing ceremony. Sadat "became embroiled in a series of concessions," Kamel wrote years later. "This ended in his total capitulation and he finally appended his signature to what Israel, in its wildest dreams, never imagined possible." Three years later, in October 1981, dissident Egyptian Army officers assassinated Sadat in Cairo as he reviewed a military parade.

Carter remembers Sadat as a hero. "The heroes of peace have been assassinated by those who hate peace," he told me, referring also to the late prime minister Yitzhak Rabin of Israel, who was assassinated in 1995. "There are those on both sides who would rather sabotage the peace process and punish those who are successful at it."

Begin emerged from Camp David perceived as the winner, having given up nothing of vital importance. "He was the strongest negotiator," in Quandt's estimation, "because he was prepared to walk away and say, 'No deal.'" But Begin found that triumph could turn to ashes. In 1982, he authorized the invasion of Lebanon, chiefly to eliminate the P.L.O. Opprobrium was heaped on Israel for permitting the mas-

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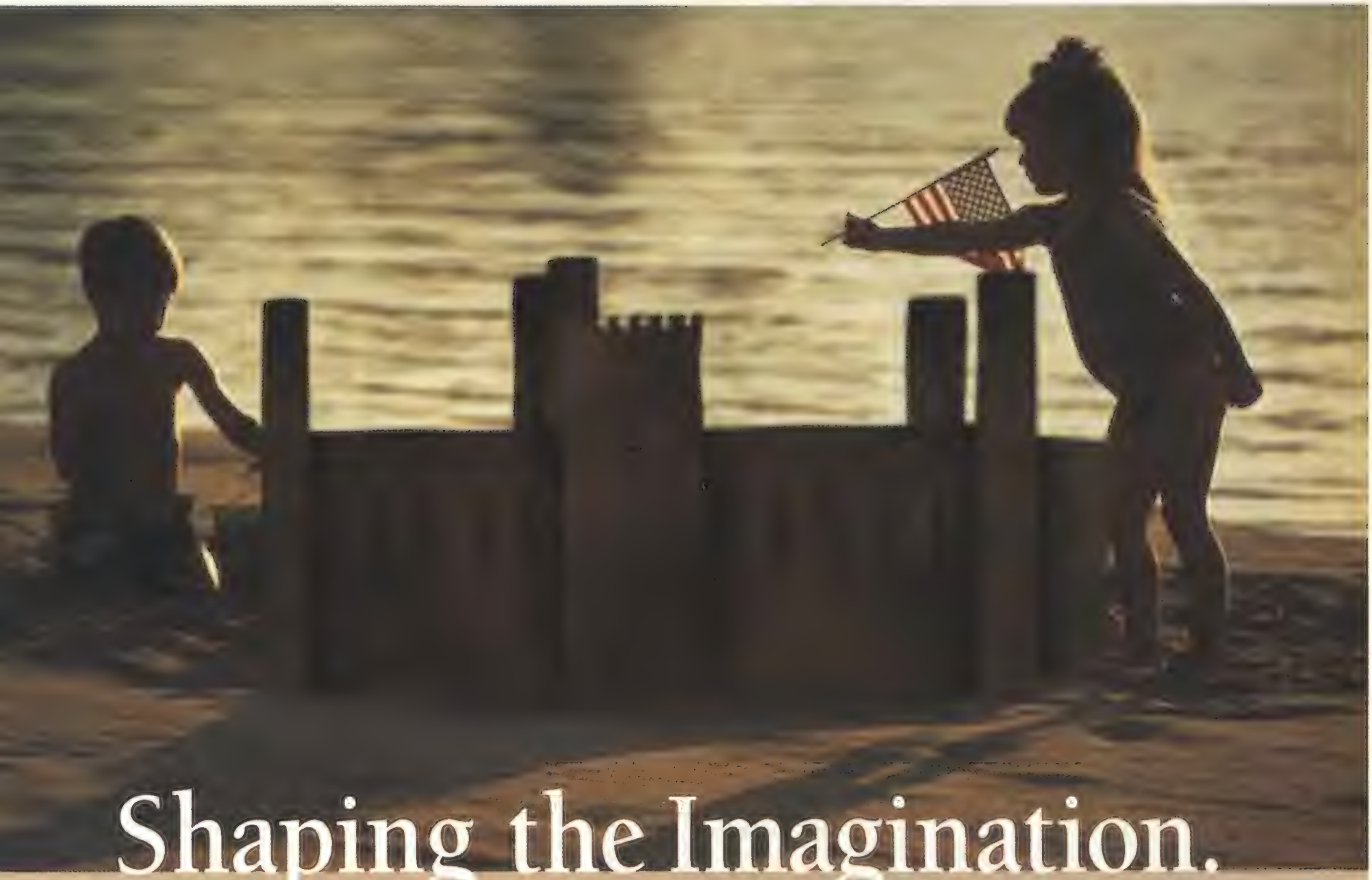

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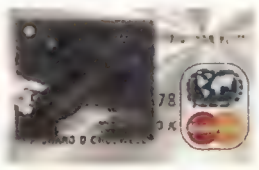

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The Camp David accords "stand with the reconstruction of postwar Europe and Japan as an American diplomatic success."

sacre of Palestinians by Lebanese Christians in a camp outside Beirut. Begin's wife, Aliza, died later that year, and Begin resigned the prime ministership. He spent the rest of his life in seclusion, dying in 1992 at age 78.

Camp David earned Carter wide praise at home but did not save him from electoral defeat two years later. Looking back, Powell says, it's clear that trying to achieve peace in the Middle East does an American president no good in the domestic political sense. "We got a smaller percentage of the Jewish vote in 1980 than we had in 1976," he recalls. "The reason is that if you're going to get an agreement, you're going to have to push the Israelis some too. If you do that, you're going to get a backlash in this country."

"It is impossible to overstate the courage of these two men," Carter said of Begin and Sadat (at the White House ceremony where they signed the accords), who faced issues "history had taught us could not be resolved."

Carter was awarded the Nobel Peace Prize in 2002, partly for the Camp David accords but also for promoting peace and human rights after his presidency. He said Camp David might have led to a comprehensive settlement if his successor in the White House had picked up where he left off. "But President Reagan took very little interest," Carter said. "Then Israel began to expand its settlements. You can't perpetuate an agreement unless it has the support of the incumbent leaders."

Richard V. Allen, national security adviser in the first year of the Reagan administration, agrees that Reagan's priorities in the Middle East differed from those of Carter. "President Reagan thought Camp David was a significant achievement," Allen says. "But he wanted to conclude an agreement on a strategic alliance with Israel, partly to resist Soviet incursions into the Middle East and partly to make a clear statement that Israel would be defended and would not be as heavily pressured as it would have been if Carter had been reelected."

In any case, the autonomy talks for the West Bank and Gaza produced little progress, whether because Washington stopped exerting diplomatic pressure, as Carter believes, or because the agreement had failed to resolve crucial issues. The United States tried to enlist the participation of Palestinians living on the West Bank, but they held out largely because the P.L.O. refused to support a process that did not recognize the group's claim to represent the Palestinians. For its part, Israel refused to accept any proposals that might compromise its settlement program or its ability to claim sovereignty over the territories.

Over the years, some of the Americans who participated in the Camp David talks have changed their opinion that it was Begin who got the best of the bargaining. Instead, they say Israel missed an opportunity to settle disputes that would only grow far more complicated. As Carter sees it, Camp David gave Israel a chance to settle the West Bank issue when there were only 5,000 or 10,000 Israeli settlers there, compared with some 200,000 today; when there was no intifada, suicide bombings or Hamas. If Begin had been more flexible and accepted ideas that Israel accepts today, such as the inevitability of a Palestinian state, reaching a comprehensive peace agreement "no doubt would have been easier in the late 1970s," Carter told me.

Still, many experts agree that the accords represent a high point in U.S. diplomacy. They "stand with the reconstruction of postwar Europe and Japan as an American diplomatic success," says Martin Indyk, the ambassador to Israel in the Clinton administration. "They were the big breakthrough in the resolution of the Arab-Israeli conflict. From that point on, it has only been a matter of time before the other parts of that conflict are settled."

James A. Baker III, secretary of state under President George H. W. Bush, says the accords "established the principles of land for peace and recognition of United Nations resolutions, which were very helpful to us in the first Bush administration." Camp David also set a precedent for other Middle East peace agreements, including that between Israel and Jordan, Baker says, adding, "I, for one, remain optimistic that in my lifetime we will see a comprehensive peace" built on Camp David and subsequent agreements.

One fact is certain. As Carter points out, "In the years before Camp David, there were four major wars between Israel and its neighbors, generally led by Egypt." In the 25 years since Camp David, there has been none. ○

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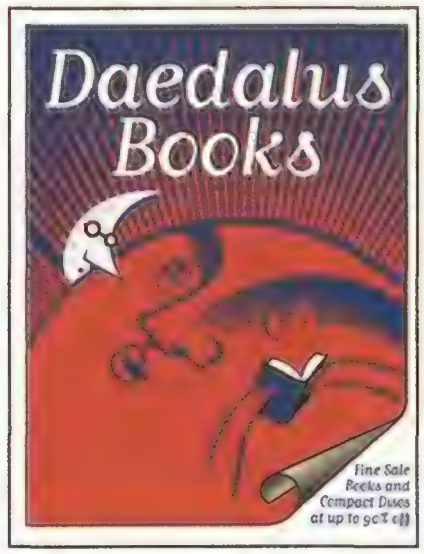

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Beacon of Light

Groundbreaking art shines at the extraordinary new Dia:Beacon museum on New York's Hudson River

BY AMEI WALLACH

IT'S ONLY FITTING THAT THE MOST eagerly awaited museum in the world of contemporary art is more than an hour removed from New York City's frenetic art scene. Many of the artists whose works went on permanent display this past May at Dia:Beacon, as the new museum is called, put space between themselves and an art world they saw as compromised and overly commercial. "These artists were inspired more by the American landscape and the American spirit than by the SoHo art scene," says collector Leonard Riggio, chairman of the Dia Art Foundation, which created the museum. "The idea of being an hour-plus away from New York City is more important than being close to it."

Dia:Beacon has 240,000 square feet of exhibition space, which is more than that of New York City's Guggenheim, Whitney and Museum of Modern Art combined. It exhibits a concentration of monumental works (many seldom, if ever, seen in public) by land artists, minimalist artists, conceptual artists and installation artists. At Dia:Beacon, says artist Robert Irwin, who helped transform the 1929 Nabisco box-printing factory in Beacon, New York, into a radiant showcase for art, "the viewer is responsible for setting in motion his own meaning."

Most of the outsize works on view in Dia:Beacon's immense skylit galleries fill a room or more. John Chamberlain's sculpture *Privet*, for instance, is a 62-foot-long, 13-foot-high hedge fashioned out of scraps of chrome and painted steel. And Walter De Maria's *Equal Area Series* (12 pairs of flattened, stainless-steel circles and squares that lie on the floor like giant washers for some enormous machine) extends through two galleries totaling 22,000 square feet. Most of these works cannot be seen in their entirety from any one place; you must walk in, around, and in some cases, within them, as in a landscape. "Difficult" art becomes accessible, the thinking goes, when a viewer's response is visceral. And concentrated.

With 240,000 square feet of galleries, the Dia:Beacon museum (below) is spacious enough to accommodate huge works such as Richard Serra's *Torqued Ellipses* (opposite). Each of the mammoth steel structures weighs 40 to 60 tons.

"What makes this museum very special is its focus on a relatively small number of artists who are shown in great depth in circumstances as close to perfect as any space I have seen," says James N. Wood, director and president of the Art Institute of Chicago. "It's totally committed to giving an art that is not necessarily ingratiating an environment where it has the best chance to speak in its own right."

Many of the 20 or so artists represented at Beacon—a hugely influential group that includes Louise Bourgeois, Dan Flavin, Walter De Maria, Michael Heizer, Donald Judd, Sol LeWitt, Agnes Martin, Robert Ryman, Richard Serra and Andy Warhol—began their careers intent on challenging some basic assumptions about art. Why did a sculpture have to sit on a pedestal and occupy space? Why did a painting have to be something you stood in front of and looked at? Why did it have to stop at the edges? Did art have to be an object at all?

MICHAEL GOVAN / DIA ART FOUNDATION; P. 67 RICHARD BARNES

Without a viewer's response, they felt, their art was incomplete. "Things work in relationships. Everything is interactive," says Dia artist Robert Irwin, who began in the 1950s as an abstract painter and who, along with Dia Art Foundation director Michael Govan, was responsible for creating a master plan for the renovation of the factory and the design of outdoor spaces. He says he approached Dia:Beacon as an artist rather than an architect. Instead of using a drawing board or models, he conceived his plan, which is itself listed as one of the artworks in the Dia collection, by walking around, back and forth, inside and outside the complex. He thought of the museum as a "sequence of events, of images," and he was mindful of the order in which visitors would enter and progress through its spaces.

At Dia:Beacon's entrance, Irwin planted hawthorn trees, which bloom white in spring and are heavy with red and orange berries in winter. They will grow to 25 feet, roughly the height of the four flat-roofed connected buildings—including a train shed—that once housed the plant.

One of the few things Irwin added to the existing structure is a small, low, brick-lined entrance. Pass through it, and "boom!" says Irwin, the ceilings soar and light floods through north-facing, sawtooth skylights and boomerangs off maple floors. You can see down the length of the twin galleries ahead, 300 feet, to industrial-size sliding doors. Through those open doors other galleries stretch another 200 feet toward sun-blasted, south-facing windows. "That moment of entering is really the power of the building," says Irwin.

The vast space swallowed up the 4,500 visitors who thronged to it opening day. In its first six weeks, 33,000 people visited the museum. "People ask me what makes this place different," says Dia director Michael Govan, 40. "There are very few places with concentrations of works, even by these artists, that are so all-encompassing and environmental. The buildings, in a way, are big enough to allow all of the artists to have their own world and the visitor to have that fantastic experience of going from world to world."

"The building is spectacular, the site fantastic," the Museum of Modern Art's director, Glenn Lowry, says of Dia:Beacon. An aisle of cherry trees adorns the museum's west garden (below).

Michael Heizer's 142-foot-long sculpture, *North, East, South, West*, for instance, steals the show for many visitors and most dramatically illustrates the idea of the interaction between the viewer and the art. The work, which Heizer calls a "negative sculpture," consists of four massive, geometric forms sunk 20 feet into the floor of the gallery. Standing at the edge of these excavations, you may experience a hint of vertigo, even as your fear of falling competes with an impulse to throw yourself in.

Andy Warhol is represented with 72 of his *Shadows* paintings, a series of 102 renderings of the same difficult-to-decipher shadow in a corner of Warhol's studio. Designed to be hung together edge to edge, like a mural, each grainy silkscreen is treated differently—printed on a black or metallic background and washed in a spectrum of vaporous colors, from Day-Glo green to choirboy red. Warhol produced the series in less than two months, between December 1978 and January 1979, showed parts of it in an art gallery, then used it as a backdrop for a fashion shoot for the April 1979 issue of his magazine, *Interview*.

Beyond the Warhols, the world that the German-born artist Hanne Darboven has constructed—called *Kulturgeschichte (Cultural History), 1880-1983,* consists of 1,590 framed photographs, magazine covers, newspaper clippings, notes, personal papers and quotations, all hung floor to ceiling in a grand, overwhelming onslaught of information. The effect is not unlike walking through a history book.

At the southern end of the museum, a rarely seen work by the late artist Fred Sandback re-creates part of his 1977 *Vertical Constructions* series. Sandback used colored yarn to outline an enormous upright rectangle. There's another one just like it a few feet away. The space they diagram appears as real as a wall of glass. You seem to be on the outside looking in, but if you step over the yarn to the other side, you find yourself once again on the outside of the illusion.

Beyond Sandback's yarn is Donald Judd's 1976 untitled installation of 15 plywood boxes. Judd, an artist, philosopher and critic who died in 1994 at age 65, wanted to strip sculpture to its bare essentials. He used industrial materials—plywood, milled metal, Plexiglas—and had his sculptures made by fabricators. From a distance, his unpainted, roughly chest-high boxes, which sit directly on the gallery's floor with space to stroll among them, appear identical. But up close you can see that each of the boxes is slightly different, conjugating a vocabulary of open, closed, spliced and bisected forms. "It is a myth that difficult work is difficult," Judd claimed. His idea

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AMEI WALLACH is an art critic whose articles have been featured in Art News, *the* New York Times, Vanity Fair *and the* Nation.

TIM BELL

"I approached the museum's design as an artist," says Robert Irwin (above, left), who collaborated with Dia director Michael Govan (above, right), and the architectural firm, OpenOffice, on the renovation of the 1929 factory that houses the new museum. Andy Warhol called his 1978-79 *Shadows* paintings (below) "disco decor" and used them in a fashion shoot for his magazine, *Interview*.

TIM BELL (2), CAREY WINFREY

that the context in which a sculpture or painting is seen is as important as the work itself—and essential to comprehending it—would become Dia:Beacon's credo.

"Looking at Judd's works, you start to think about limitless possibilities," says Riggio (who with his wife, Louise, contributed more than half the $66 million it took to realize the museum). "You feel not just the brilliance of the artist himself, but you also feel the potential of the human spirit, which includes your own. You see what a great mind can do, so it's more than about the art."

"OBVIOUSLY, THE MODEL for what we are doing is in Marfa," says Riggio, referring to the museum that Judd founded in an abandoned fort in West Texas cattle country in 1979. Judd hated conventional museums, and he likened permanent galleries, where works of several different artists are grouped in a single room, to "freshman English forever." Judd came up with another way: displaying individual artists in buildings adapted to complement their art.

Judd's idea of converting industrial buildings into galleries can be seen today in the raw spaces of the Los Angeles Temporary Contemporary and at MASS MoCA in North Adams, Massachusetts. But Judd's cantankerous, visionary spirit finds its fullest expression at Dia:Beacon. "The artists represented at Dia, especially Judd, are really the founders of this place's aesthetic," says Govan. "I see this museum as a series of single-artist pavilions under one diaphanous roof of light."

In 1977, Judd met German art dealer Heiner Friedrich, a man with a nearly religious zeal to change the world through art. In 1974, Friedrich and his future wife, Philippa de Menil, the youngest child of Dominique and John de Menil of the Schlumberger oil fortune, created the Dia Art Foundation. (Dia, the Greek word for "through," is meant to express the foundation's role as a conduit for extraordinary projects.) Over the next decade, Friedrich and Philippa gave millions of dollars to finance works by artists they admired. Typical of those the couple funded was Walter De Maria's 1977 *Lightning Field*—400 stainless-steel poles set in a one-mile-by-one-kilometer grid in the New Mexico desert.

In 1979 Dia began purchasing the abandoned Texas fort and its surrounding 340 acres at the edge of Marfa for Judd, who, according to Riggio, "turned an army barracks into what I think is easily the best single-artist museum in the world." Then, in the early 1980s, Friedrich's dominion began tumbling down. There was an oil glut. Oil stocks crashed, and Dia ran out of money. Friedrich resigned from the board and a new board instituted a reorganization. Dia's new mission did not include funding gargantuan artistic projects.

Judd's contract gave him the Marfa property, the art it contained and a legal settlement of $450,000. He reconstituted his Texas enterprise as the Chinati Foundation, named for the surrounding mountains, and commissioned such artists as Claes Oldenburg and Ilya Kabakov to create new works. Some other Dia art was sold, allowing a new director, Charles Wright, to open the Dia Center for the Arts in 1987 in the Chelsea section of Manhattan, where the foundation continues to mount single-artist exhibitions.

In 1988, Michael Govan, then just 25 and deputy director of New York's Guggenheim Museum, visited Judd in Marfa, an experience he calls "transformative." Afterward, Govan says, "I completely understood why Judd had abandoned working with other institutions and made his own. Other museums were concerned with admissions revenue, marketing, big shows and building buildings that people would recognize. And all of a sudden I see Judd with this simple situation, this permanent installation, taking care of every detail in the simplest way. And the feeling was something you could be entirely immersed and lost in."

Two years later, Govan accepted the directorship of the scaled-down Dia. "I knew it was the one place that held more of Judd's principles than anyplace else," he says, "whether there was money to execute them or not." In fact, there was a $1.6 million deficit. But Govan's agreement with Dia board members was that they would consider a permanent home for the collection if he could stabilize the finances. By 1998, the budget had been balanced for three years. That was also the year that Dia showed *Torqued Ellipses*, a new work by sculptor Richard Serra.

The three monumental sculptures—looming formations each twisted out of 40 to 60 tons of two-inch-thick steel plate—dominated the Chelsea gallery as they now (along with the latest in the group, *2000*, a torqued spiral) dominate their space at Dia:Beacon. As you circle each behemoth, you are as aware of the sinuous spaces between the sculptures as of the forms themselves. But as you move inside the openings of the monoliths, everything changes. However bullied

Michael Heizer's vertigo-inducing sculpture *North, East, South, West* consists of four geometric forms produced from weathered steel and inserted 20 feet deep into the gallery's concrete floor.

TIM BELL; PP. 72,73 RICHARD BARNES

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Leonard Riggio, founder and chairman of Barnes and Noble, had scarcely heard of Dia when he went to see the Serra show. "It was magic to me," he recalls. At Govan's urging, he spent nearly $2 million to buy *Torqued Ellipses* for Dia, jump-starting its dormant collecting program. At about that time, Govan and curator Lynne Cooke, who had also come to Dia in 1990, began looking for space for a permanent museum. One day, flying some 60 miles north of New York City in a rented Cessna 172—Govan got his pilot's license in 1996—they spotted a faded Nabisco factory sign on the banks of the Hudson River. Back in New York, Govan traced the building to the International Paper Corporation and drove up to see it on a wet spring day.

"So I walk into the building and it is *spectacular*," he remembers. "I said, 'Would they ever consider giving it to a museum?' They said, 'Absolutely not. This is for sale.'" In the end, however, International Paper donated the factory and the land to the museum, and Govan raised the money for the renovation through public and private contributions. The project (a three-way collaboration between Irwin, Govan and the New York City architectural firm OpenOffice) began in 1999. At the same time, Govan and curator Cooke were building the collection.

In 1994, Govan had learned that collector Charles Saatchi wanted to sell a rare group of paintings by the New Mexico-based artist Agnes Martin. "It seemed to me that this work of art was very much like what Dia had collected," he recalled. "It was a big epic—really a major work." But Govan was too late; the paintings had already been sold to the Whitney. "So I asked if she would consider doing another series," Govan says. Martin didn't respond. "Then, in 1999, I get a call saying that Agnes is working on the Dia paintings, and they are really important to her. I said, 'What?'" Without telling Govan, Martin, now age 91 and still painting, had taken up the challenge and gone ahead with the project.

Today her *Innocent Love* occupies an entire gallery at Dia: Beacon. The paintings play variations on shimmering bands of color. Her *Contentment* consists of six vertical bands of pale yellow; *Perfect Happiness* is a series of vertical washes that translate as little more than a glow on the retina. The paintings reflect the shifting quality of desert light, making the gallery seem as spacious as New Mexico's vistas.

Serra's *Torqued Ellipses* have quite the opposite effect. They overpower the factory's long train shed, into which they are wedged. Serra chose the space himself. "You hardly ever get to do that in a museum," he says. "I don't think there's another museum in the world like this. If you can't find someone to look at between Warhol, Judd, Flavin, Martin and Ryman, it's not the art's fault." ○

John Chamberlain, who playfully calls the 62-foot-long-by-13-foot-high *Privet* his "fauve landscape," used intertwining scraps of painted steel and chrome to form the candy-colored sculpture.

Keeping Up with Mark Twain

Berkeley researchers toil to stay abreast of Samuel Clemens' enormous literary output, which appears to continue unabated

BY RON POWERS

NINETY-THREE YEARS after his death in 1910, Samuel Langhorne Clemens has been making some ambitious career moves. It's almost as though the old sage of the Mississippi, better known as Mark Twain, is trying to reposition himself as the King, as friends and colleagues called him long years before Elvis was even born.

In July, an American Sign Language adaptation of the 1985 musical *Big River*, based on Twain's *Adventures of Huckleberry Finn* and featuring deaf and hearing actors, opened in New York City to enthusiastic reviews. A recently rediscovered three-act play by Twain, *Is He Dead?* (written in 1898), will be published next month and has been optioned by a Broadway producer. In 2001, the *Atlantic Monthly* published a "new" Twain short story, "A Murder, a Mystery and a Marriage," which he'd submitted to the magazine 125 years earlier. He was the subject of a Ken Burns documentary on PBS last year. And the venerable Oxford University Press issued a 29-volume edition of Twain's published writings in 1996. New biographies and works of critical scholarship are in the works.

In fact, if this new rush of celebrityhood grows any more intense, Mark Twain may want to eat the words he aimed at another overexposed immortal. "Even popularity can be overdone," he groused in the novel *Pudd'nhead Wilson*. "In Rome, along at first, you are full of regrets that Michelangelo died; but by and by you only regret that you didn't see him do it."

Of Twain's many fans, who are apparently growing in number, none could feel more pleased—or more vindicated—by the renewed interest than the steadfast editors of the Mark Twain Project at the University of California at Berkeley, who have been at work for 36 years on a scholarly undertaking of almost inconceivable proportions: to hunt down, organize and interpret every known or knowable scrap of writing that issued from Sam Clemens during his astonishingly crowded 74 years on earth. The University of California Press has so far produced more than two dozen volumes of the project's labors, totaling some 15,000 pages, including new editions of Twain's novels, travel books, short stories, sketches and, perhaps most significantly, his letters.

What distinguishes the works is the small print—the annotations. The information contained in these deceptively gray-looking footnotes ranks with the most distinguished scholarship ever applied to a literary figure. Amounting almost to a "shadow" biography of Twain, the project has been an indispensable resource for Twain scholars since the 1960s.

But esteem does not always spell security. If the project's editors are feeling happy these days, it is only now, after nearly four decades, that their project is emerging from obscurity, even on their host campus, after a virtually unrelieved funding crisis. Mark Twain, of course, would be sympathetic. "The lack of money is the root of all evil," he liked to remind people; and as for approbation, "It is human to like to be praised; one can even notice it in the French."

THE ANIMATING FORCE behind the project, its untiring ambassador and conceptual mastermind, can usually be found at his desk in the project's newly refurbished and expanded quarters on the fourth floor of the Bancroft Library on the Berkeley campus. This is Robert Hirst, an engagingly boyish figure, despite his 62 years, his thatch of white hair and his sometimes florid coloring (he's excitable and sharp-

Mark Twain (right, in 1906) "simply never, never goes stale," says editor Harriet Smith (above, center, with fellow sleuths, from left, Michael Frank, Victor Fischer and Lin Salamo). If all goes well, annotating Twain's letters should be completed by 2021.

EDWARD CALDWELL; P.75 MARK TWAIN PAPERS, BANCROFT LIBRARY, UNIVERSITY OF CALIFORNIA, BERKELEY

witted, not unlike Twain himself). Often the white hair is the only visible part of Hirst; the rest is obscured by stacks of Twainian treasure: manuscript-crammed filing cabinets, shelves of peeling volumes, piled papers and manila folders that threaten to cascade into literary landslides. "No Tiffany wallpaper yet," Hirst says wryly of the renovation this past June, which increased the office space by three rooms. (The reference is to the walls of Twain's lavish house in Hartford, Connecticut.) "But we're painting and redecorating. Straightening the pictures on the walls."

Hirst is sixth in a line of distinguished scholars to supervise the Twain archives—a line that begins with the author's official biographer, Albert Bigelow Paine, before Clemens' death and continues with Bernard DeVoto, Dixon Wecter, Henry Nash Smith and Frederick Anderson. Hirst, after studying literature at Harvard and Berkeley, joined the project in 1967 as a fact checker and proofreader, one of many young graduate students hired to do the grunt work for the professors issuing the Twain volumes produced by the University of California Press. Hirst expected to stay only a year or two. Suddenly it was 1980. By then, deeply invested in the project's goals and methods, Hirst signed on as the project's general editor. Aside from a few years teaching at UCLA, he has never done anything else. He probably knows more about Mark Twain than anyone alive—perhaps even more than the dreamy author knew about himself.

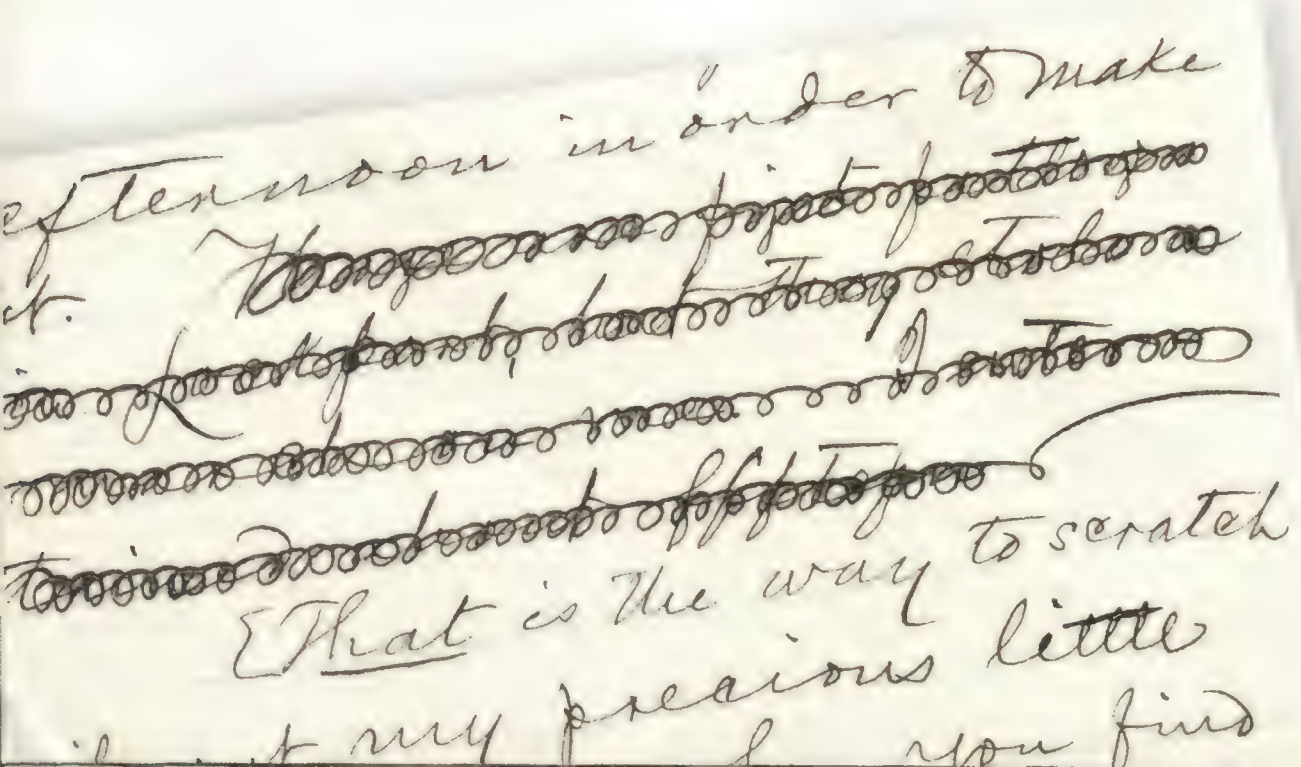
Beneath Hirst's warmth and whimsical humor, beneath even the laser intensity and the steely will that underlie his surface charm, one can detect a glimpse, now and then, of a puzzled young man from Hastings-on-Hudson, New York, wondering where all the time has gone. The answer is that it has gone toward carrying out his assignment, even if the task proves to exceed Hirst's allotted time on earth, as it almost certainly will.

Hirst loves facts and the unexpected illumination that can burst forth from facts scrupulously extracted, arranged and analyzed. "I especially love the ways in which the careful, comparative readings among his documents help us discover new truths that had not been obvious in Twain or his work," he says.

One such discovery is detailed at length in the California Press' 2001 edition of *Adventures of Huckleberry Finn*. A long-standing myth surrounding this founding work of vernacular American literature was that Twain, having discovered Huck's natural voice, was suddenly "liberated" from the cerebral, piecemeal rhythms of composition, and wrote in long dream-like bursts of uninterrupted dialect. The highest example of this "charmed" writing was Chapter 19, Huck's beautiful and lyrically flowing description of a sunrise on the Mississippi. ("Then the river softened up, away off, and warn't black any more, but gray; you could see little dark spots drifting along, ever so far away...then the nice breeze springs up, and comes fanning you from over there, so cool and fresh, and sweet to smell.") But as the project editors studied the handwritten draft of the chapter—part of the recently recovered first half of Twain's original manuscript—and compared it with the first edition, it became obvious that no such dream state ever enveloped Twain. He wrote the passage the old-fashioned way: by patient trial and error, with an obviously conscious awareness of technique. In other words, Twain was not a kind of idiot savant, as some earlier scholars patronizingly supposed, but a disciplined professional writer with sophisticated skills.

IT DOES NOT ENTIRELY gladden Hirst that the 20-plus full and partial biographies of Twain have tended to be infected by what he calls "hobbyhorses"—the biographers' pet theories, academic arguments and armchair psychoanalyses. (To be fair about it, Mark Twain virtually begs for psychological scrutiny, with his famous bouts of guilt and sorrow, his themes of dual and sham identities, his self-destructive investment binges and his late-life vision of man as machine.) "All these ideas about him, these theories—they need always to be tested against the stubborn facts of the documents," Hirst says. "That alone—and it is a process that can only happen over a period of years—will increase our understanding of what he was like."

Using decipherable deletions, like this one in an 1869 letter to fiancée Livy Langdon, Twain managed to convey ambivalence.



Under Hirst, the project has grown into a protean resource for those who would dismount the hobbyhorses and follow the facts wherever they lead. Called "magisterial" and "an immense national treasure" by some scholars, the project has produced new techniques in textual analysis and in the capacity to depict multiple revisions on a single page of type. It has offered vivid glimpses not only of Twain but also of the people central to his life, and it has provided a fresh index to the political and cultural nuances of the 19th century. Twain himself provided what

MARK TWAIN PAPERS, BANCROFT LIBRARY, UNIVERSITY OF CALIFORNIA, BERKELEY

Chief editor Robert Hirst has been hunting down and organizing Mark Twain's work for 36 years. "I feel enormously lucky," he says.

might be the project's motto: "Get your facts first, and then you can distort 'em as much as you please."

To be sure, some scholars complain that Hirst and company are overdoing it. "Let Mark speak to us without a gaggle of editors commenting on his every word!" one professor grumbled. But others, like the University of Missouri's Tom Quirk, are delighted by the painstaking effort. "It's remarkable what good work they do," says the author of several critical works on Twain. "Every time I've wanted an answer to a question, they've had it, and they've dropped all the important work they're doing to accommodate me. And they do that for everyone, regardless of their credentials. If the Twain Project is glacial—well, we need more glaciers like that!"

The most recent example of the project's value to scholars is the forthcoming publication of Twain's play *Is He Dead?* When Shelley Fisher Fishkin, Stanford University professor and Twain scholar, told Hirst that she would like to publish the play after coming across it in the project files a year ago, he plunged into "establishing" the text for her, making sure that her edited version of the play accurately reproduced the playscript worked up by a copier in 1898 from Twain's draft (since lost). Hirst also corrected likely errors in the copier's version and proofread Fishkin's introduction and postscript.

RON POWERS, a Pulitzer Prize winner and author with James Bradley of Flags of our Fathers, *is writing a biography of Twain.*

EDWARD CALDWELL

ONE REASON for the project's ever-lengthening timetable is that Mark Twain won't stop writing. His known output at the time of his death at age 74 was prodigious enough: nearly 30 books, thousands of newspaper and magazine pieces, 50 personal notebooks and some 600 other literary manuscripts—fragments, chapters, drafts, sketches—that he never published.

But nearly a hundred years later, his writings continue to surface. These mostly take the form of letters, turned up by collectors, antiquarians and vintage-book sellers, and by ordinary people thumbing through boxes of dusty memorabilia stored by great-uncles and grandparents in family cellars and attics. "We now have, or know of, about 11,000 letters written by Mark Twain," says Hirst. How many are still out there? "My conservative estimate is that he wrote 50,000 of them in his lifetime. Not all of them were long epistles. Most were business letters, replies to autograph requests—'No, I can't come and lecture,' that type of thing." Twain, of course, was capable of turning even a dashed-off line into something memorable. "I am a long time answering your letter, my dear Miss Harriet," he confessed to an admirer whose last name does not survive, "but then you must remember that it is an equally long time since I received it—so that makes us even, & nobody to blame on either side."

"We see them coming in at the rate of about one a week," says Hirst. "People will walk in off the street and say, 'Is this a Mark Twain letter?' They even turn up on eBay."

If 50,000 is a "conservative" estimate, what might be the high end of an informed "wild-and-crazy" sort of guess? Hirst hesitates. "My colleague, Mike Frank," he says, "has a hunch there might be 100,000 of them in all."

Twain valued the Clemens family history recorded in his mother's Bible from 1817. But he sometimes skewered religion in his writing.

SINCE 1988, the project, through the University of California Press, has issued six volumes of Mark Twain's letters, nearly two-thirds of them seeing print for the first time. The published volumes cover the years from 1853, when Sam Clemens was 17 and exploring New York City and Philadelphia, to 1875, by which time Mark Twain, age 40, was at work on *The Adventures of Tom Sawyer* and at the threshold of enduring fame. Hirst estimates that annotating Twain's remaining 34 years' worth of letters will take until 2021. So documenting Twain's life will have taken 54 years, or more than two-thirds the time he took to live it.

The letters series is but one of the project's four distinct endeavors. Another is the works of Mark Twain (scholarly editions of the writer's published works, including his commissioned letters to various newspapers and journals). A third is the Mark Twain Library (paperback editions of the works without the scholarly notes, for classroom use and general readership). Yet a fourth, begun in 2001, is an on-line archive of Twain's works and papers: http://bancroft.berkeley.edu/MTP.

But the letters research has set the project apart. Hirst staked his career—"my life," he says—on this vision almost as soon as he was promoted to general editor.

"When I came in, there were three volumes of letters already in proof," Hirst recalls. "But there were only about 900 letters, total. The job had been rushed. They had done no search for new letters."

Meanwhile, though, a colleague of Hirst's named Tom Tenney had started to write to libraries around the country inquiring about newly found Mark Twain letters. "Well, it began to rain Xeroxes," says Hirst. He spent two frustrating years trying to shoehorn these new discoveries into the volumes already in type. It wasn't working. "And so I took my life in my hands and proposed to the others that we junk the proofs and start over."

In 1983, Hirst's proposal was implemented. It took five more years for the first revised and enlarged volume to emerge—a staggering 1,600 pages in length. The letters themselves account for less than half the total. Photographs, maps and manuscript reproductions account for several dozen more pages. But the great bulk of the volume—and of the five letters editions published since—consists of annotations.

Annotations are the project's hallmark, an ever-accumulating marvel of footnoting-as-detective-work. Most of the work is done by Hirst's five coeditors (average length of tenure: 27 years), who hunt down virtually every reference to a person, news article, political event, or happening and explain its relevance. For example: in an 1869 letter from the lecture trail to his fiancée, Olivia (Livy) Langdon, the 33-year-old author laments affronting some young men who had shown "well-meant & whole-hearted friendliness to me a stranger within their gates." Seizing upon the phrase "stranger within their gates," the alert editor traced it to the Bible (Exodus 20:10)—an efficient reminder of Twain's deep familiarity with the Scriptures, later a target of his bitter satire. The annotations enlarge the letters (as well as the published texts themselves), forming them into a kind of informational neuro-system that interconnects the private man,

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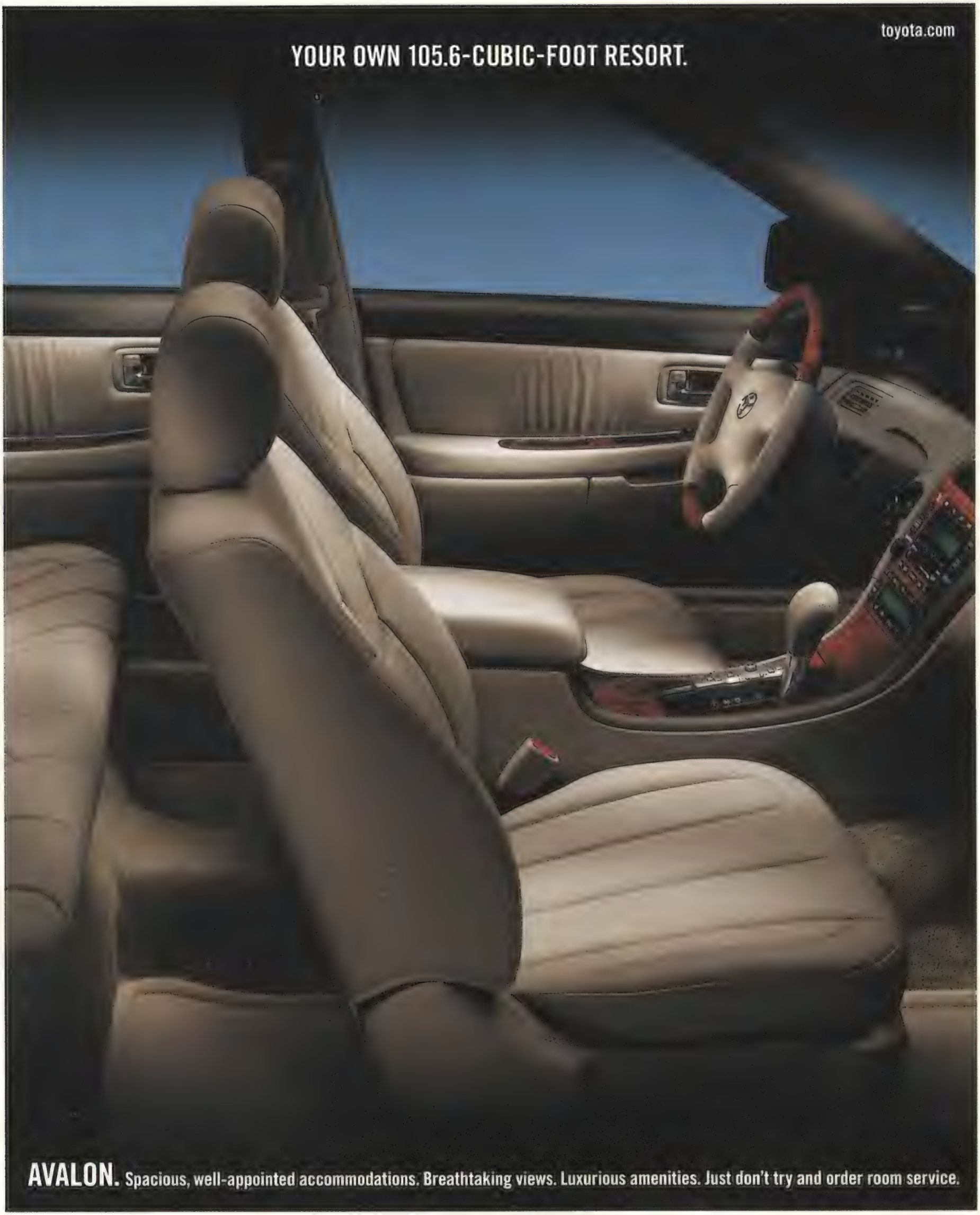

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the public writer and the leading citizen of the 19th century.

"I'm a big believer, with Bob [Hirst], that there's a whole world of popular culture that never makes it into the learned volumes about any given author," says editor Lin Salamo, who arrived at the project as a 21-year-old in 1970. "Ads in newspapers of a certain period. The corner-of-your-eye stuff that may somehow work its way into a writer's consciousness. Anyone's life is made up of the trivial; scraps of found images and impressions. Mark Twain was a keen observer; he was a sponge for everything in his range of vision."

Hirst doesn't apologize for this exhaustive approach, the wails of the lean-and-meaners be damned. "Literary criticism, as I was taught it at Harvard," he says, "emphasized the notion that you couldn't really know an author's intention, and so you might as well ignore it. Well, the kind of editing we do is founded on the notion that discovering the author's intention is the first principle for anyone who is establishing a text. This kind of thinking is definitely a small and fragile backwater swamp compared to what goes on in academic literary departments." He pauses and smiles wickedly.

"I feel enormously lucky to have found my way to this swamp."

THE "SWAMP" at times can seem more like an ocean, with Hirst as a kind of Ahab, pursuing the Great White Male. There is always more Twain out there, and Hirst wants all of it. Personal letters are far from the only form of Mark Twain's writing still awaiting rediscovery. The handwritten originals of his first two major books, *The Innocents Abroad* and *Roughing It*, are still at large—if they have not been destroyed. (Finding them is not a forlorn hope: it was only 13 years ago that the long-lost first half of *Adventures of Huckleberry Finn*—665 pages of priceless manuscript—turned up in a Los Angeles attic, opening up a body of insights into Twain's revision process for that seminal novel.)

The collection includes 537 letters Twain wrote to his wife, Livy (left). Clara (right) was the only one of three daughters to survive him.

MARK TWAIN PAPERS, BANCROFT LIBRARY, UNIVERSITY OF CALIFORNIA, BERKELEY (2)

Perhaps even more enticing to scholars are missing papers from the time that the adventurer Sam Clemens became the literary artist Mark Twain. These are the later dispatches that the newly pen-named Twain sent to the Virginia City (Nevada) *Territorial Enterprise* from the middle of 1865 through early March 1866. The *Enterprise*, born in the boomtown years of the Comstock silver lode, attracted a coterie of wild, gifted young bohemians to its pages, including a certain auburn-haired fugitive from Civil War duty who (luckily for American letters) proved hopeless as a prospector. Clemens wrote articles, sketches and hoaxes for the paper. Later he quit and drifted to San Francisco. There the young man hit rock bottom. Broke, unemployed, drinking, suicidally despondent, he turned again to the *Enterprise*, sending the paper a dispatch a day for the next several months. The work rehabilitated Clemens' self-esteem and focused his destiny. Though several of the dispatches to the *Enterprise* have been preserved, most are missing.

Joe Goodman, Clemens' editor at the paper and a lifelong acquaintance, maintained Sam never did anything better than those letters. Their loss has deprived us of a way to view Twain's metamorphosis as a writer. Moreover, only three of his personal letters survived from all of 1865. "Anything we could recover from that period would give us an enormous advantage," says Hirst.

A hint of the young Twain's emerging wit during this period can be found in his send-up of a society writer's account of a fancy dress ball: "The charming Miss M. M. B. appeared in a thrilling waterfall, whose exceeding grace and volume compelled the homage of pioneers and emigrants alike. . . . Miss C. L. B. had her fine nose elegantly enameled, and the easy grace with which she blew it from time to time, marked her as a cultivated and accomplished woman of the world. . . ."

HIRST HAS WORRIES about who—if anyone—will replace him and his staff when they retire. The editors have coalesced into a collaborative hive in which each knows the others' areas of specialized scholarship, and can critique, reinforce or add depth to a colleague's task of the moment.

Their discoveries often have produced new insights into Twain's thought patterns. For example, the editors have discerned specific intentions within the 15 or so distinct ways he had of canceling out words and phrases as he wrote. "Sometimes his cancellations made the words hard to read, sometimes they made them impossible to read, sometimes he just put a big 'X' through a passage, and sometimes he even made a joke of his cancellations," says Hirst, "making what I call deletions-intended-to-be-read. He did that a lot in his love letters when he was courting Livy [whom Clemens married in 1870]."

"Scold away, you darling little [rascal] sweetheart," he wrote to her in March 1869—drawing a line through "rascal" but leaving the word legible. On another occasion, Livy

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Afraid of heights.

Wouldn't settle for a window that blocked a single star.

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wrote to ask him why he had heavily deleted a certain passage. In his reply, he made a point of refusing to answer her, and added: "You would say I was an love-sick idiot," with the word "love-sick" obscured by looping squiggles. He then added, playfully, knowing full well that his prim and proper fiancée would not be able to resist deciphering the sentence: "I could not be so reckless as to write the above if you had any curiosity in your composition." Apparently his deletion techniques began to preoccupy Livy: after thickly scribbling over a sentence in still another letter, he declared, "*That* is the way to scratch it out, my precious little Solemnity, when you find you have written what you didn't mean to write. Don't you see how neat it is—& how impenetrable? Kiss me, Livy—please."

Hirst's major innovation has been a typographic manuscript notation system that he calls "plain text." It is a system of transcribing Twain's manuscripts using shading, cross outs, line-through deletions and the like that allows the reader to trace the author's stages of revision, including blank spaces he intended to fill in later, synonyms stacked above a badly chosen word or revisions scrawled in the margins—all on a single document.

For Hirst, Twain offers as much replenishment to the increasingly ineloquent contemporary world as he did to his own times. "I guess I just don't know anyone who can move me, or make me laugh, like he can," Hirst says, "and he can do it with things that I've read a dozen times before. And he can do the same thing with stuff I've never seen before. I don't think I've ever seen anyone with as much pure verbal talent."

In an 1850 daguerreotype, the earliest known image of Clemens, the 15-year-old apprentice printer holds type spelling out his name.

As for Twain's continuing timeliness: "I was just looking at an unpublished piece of his called 'The Undertaker's Tale,' which he dashes off one summer day in his study," Hirst says. "It's a kind of mock Horatio Alger story, set in the family of an undertaker. Twain brings the story down to dinner and gleefully reads it to the family. Shocked silence! Livy takes him outside for a walk and talks him out of trying to publish it. But he saves it! And anybody who watches [the HBO series] "Six Feet Under" knows that in some way this is a joke that has come into modern consciousness without too much revision. He's 130 years ahead of his time!"

WITH 34 YEARS of the author's life still to organize and annotate, the Mark Twain Project shows about as much evidence of slowing down as Ol' Man River, though the threat of extinction due to the collapse of grant renewals has taken a growing toll on Hirst's blood pressure, and obliged him, in recent years, to spend more time as fund-raiser than in his preferred role as a manuscript detective. Vacations, and even work-free weekends, are a rarity. He relaxes when he can with his wife of 25 years, the sculptor and painter Margaret Wade. He keeps in touch with son Tom, a sophomore at Hampshire (Massachusetts) College, steals time for daughter Emma, a high school sophomore in San Francisco across the Bay, and pursues his decades-long quest to "sivilize" (as Huck would have it) the large, sloping backyard of the family house in the Oakland hills. "There's a stream running through it, and I'm trying to landscape it," he says. "It's sort of a cross between the Aswan Dam and the Atchafalaya Cutoff." [1]

The project got a big boost in October 2002, when the Berkeley Class of 1958 announced that in honor of its upcoming 50th reunion, it would raise funds for the project. The goal, resonating with the class's year, is $580,000. Already, says class president Roger Samuelsen, $300,000 has been pledged. "I've always been a fan of Mark Twain," says Samuelsen, a retired university director. "I go backpacking every year with my brother and friends, and we always bring along stories by Twain to read around the campfire. As for our class, we feel that this is something that goes right to the core of the university's research and instructional values."

One of Hirst's coworkers is Harriet Smith, who has spent a greater portion of her life with the author than any of her colleagues: her father, Henry Nash Smith, once oversaw the project and ranks among America's foremost Twain scholars. "After all these years, I still keep a folder of Twain's work that hits me," she says. "It never ceases to amaze me—the turn of phrase, the facility for using the language that comes so naturally to him." And, she adds, "The passion for social justice, for honesty, for exposing hypocrisy, his hatred of imperialism and war—he simply never, *never* goes stale."

Her tribute would have come as no surprise to Mark Twain, who once summed up his enormous appeal with deceptive modesty. "High & fine literature is wine, & mine is only water," he wrote to a friend. Then he added: "But everybody likes water." ○

[1] A reference that, had it appeared in a Mark Twain papers volume, would be thoroughly explained in this footnote.

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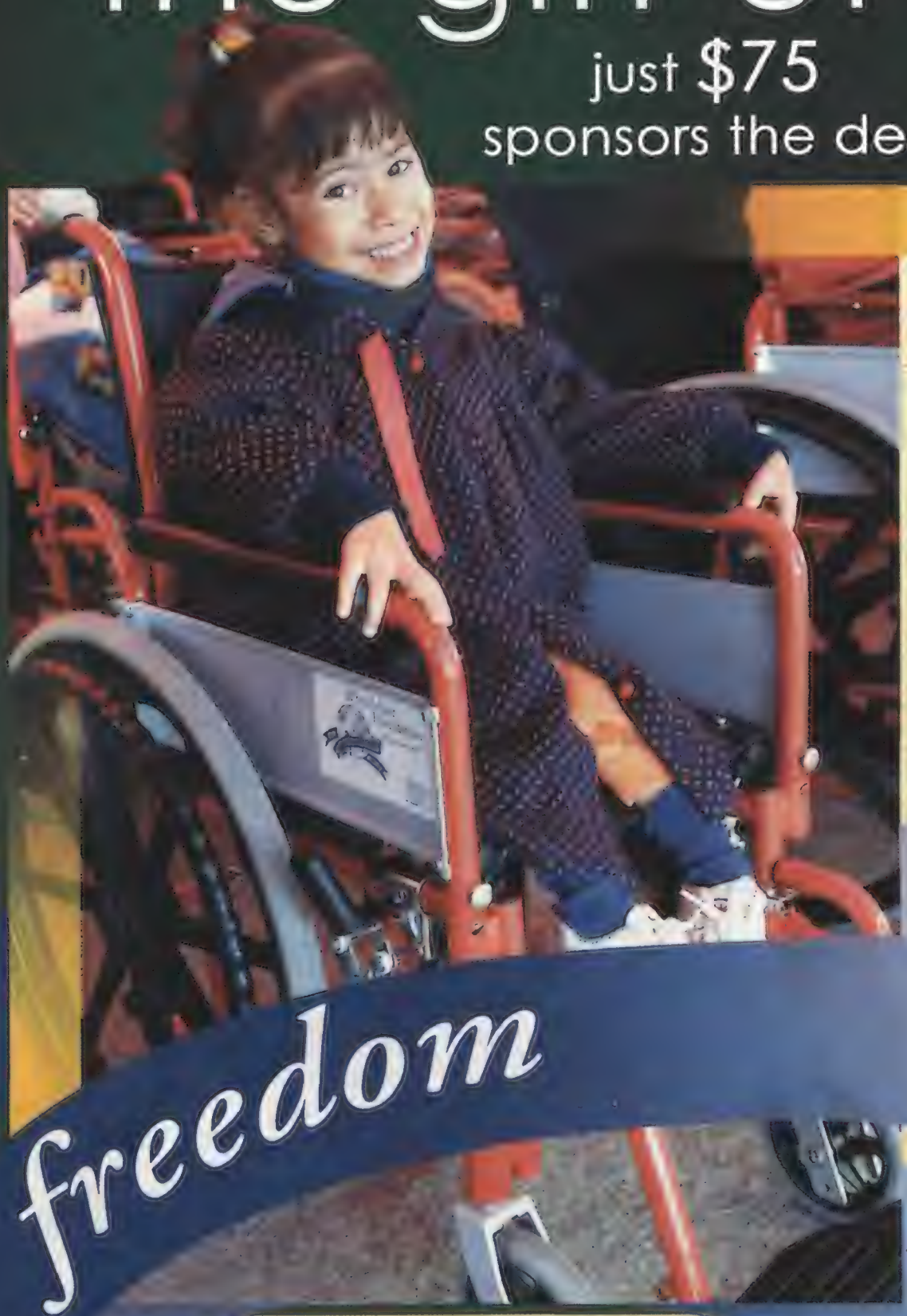

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Philadelphia, 1964: Robert Pete Williams (born 1914, died 1980) "was playing very lightly, just brushing the strings," Waterman recalls.

FOCUS ON THE BLUES

Richard Waterman's never-before-published photographs caught the roots music legends at their down-home best

BY DAVID FRIEND

PHOTOGRAPHS BY DICK WATERMAN

DICK WATERMAN'S FRONT PORCH resembles many in timeless Mississippi: wicker-back rockers, a bucktoothed rake, withered hanging plants. But step through the front door and you're in the proud, disheveled 1960s. The living-room walls are adorned with posters for long-ago concerts. Shelves swell with LPs. On tabletops and couches are stacks and stacks of vintage photographs. B.B. King and

Ann Arbor, 1970: Roosevelt Sykes (1906-1983) played piano. Big Mama Thornton (1926-1984) sang "Hound Dog" before Elvis did.

Janis Joplin, Muddy Waters and Howlin' Wolf. Waterman's pictures of old bluesmen (and women), taken over four decades, include priceless artifacts of the music's glory days, and until now they've been all but hidden.

Perhaps no one alive has known more blues masters more intimately than Richard A. Waterman, 68, a retired music promoter and artists' manager who lives in Oxford, Mississippi. He broke into the business in 1964, when he and two friends "rediscovered" Son House (guitar mentor of Robert Johnson and Muddy Waters). Waterman went on to manage a cadre of blues icons (Mississippi Fred McDowell, Skip James and Mississippi John Hurt, among them), promoted the careers of their electrified musical progeny (Luther Allison, Buddy Guy, Junior Wells), and took under his wing a 19-year-old Radcliffe freshman named Bonnie Raitt and managed her career for about 18 years, helping her become one of her era's reigning blues guitarists and singers.

Through it all, Waterman carried a Leica or Nikon camera and committed thousands of musicians to film, catching the magical and the mundane. Usually he just stashed the photographs in a drawer or closet. Though a relentless advocate of other artists, he never got around to publishing his own work, perhaps out of some bone-bred aversion to seeing things through. "I've been trying to get him off his you-know-what to get these photographs out to the world," says Raitt.

They are finally surfacing, thanks to a chance encounter in 1999. Chris Murray, director of the Govinda Gallery in Washington, D.C., was strolling down an Oxford street when he spotted a number of Waterman's shots in a framing shop. Within hours, he and Waterman were talking about doing a book. Their project, *Between Midnight and Day*, is scheduled to be published next month by Thunder's Mouth Press. Now those images, like the blues veterans they depict, are resonant again after decades in the dark. "This was no more than a hobby," Waterman says of his photography. Despite many years in the South, Waterman's high-pitched voice is still shaded with notes of his Boston boyhood. "I never considered myself a chronicler of my times."

"That's like Faulkner saying that he was a farmer, not a writer," says William Ferris, a folklorist and a former chairman of the National Endowment for the Humanities. "There's no question [Waterman] knew what he was doing and he did it systematically, like any good folklorist or documentary photographer. He is a national treasure."

"When I hear blues," says Waterman (at home in Oxford), "I remember being with my friends."

Howard Stovall, a former executive director of the Memphis-based Blues Foundation, says Waterman "had amassed an incredible body of work before it even occurred to him that there was a '*body* of work.' " He adds, "There's probably no one in America who was that close to that many blues artists—with a camera in his hand."

Waterman's camera work is only now coming to light, but his efforts on behalf of musicians have long been recognized. "Dick helped shepherd the blues to a place in the culture that truly befits its worth," says Raitt. He has had David-and-Goliath triumphs over record companies, extracting copyrights and royalties for blues musicians and their heirs. "In those days," says James Cotton, the Mississippi-born harmonica master and bandleader (whom Waterman did not represent), Waterman "was the tops because he treated his artists right *and* he made them money." Peter Guralnick, author of biographies of Robert Johnson and Elvis Presley, sees a connection between Waterman's management style and his photography: "Dick's [career] has always been about treating people fairly. I think the photographs are about trying to reflect people honestly."

Since 1986, Waterman has made his home in the Delta, that fertile corner of northwest Mississippi known for growing cotton and bluesmen. He describes himself as one of Oxford's token Northerners. "Every Southern town has to have a crackpot eccentric Yankee," he says. As it happens, he lives a short drive from Clarksdale, site of the mythical "Crossroads," popularized by Eric Clapton and Cream, where blues legend Robert Johnson supposedly traded his soul to the Devil in exchange for a wizard's way with a guitar.

Lately, Waterman, who retired in the early 1990s from managing musicians, has had little time for relaxing on his porch. He photographs performers at blues festivals, exhibits his pictures hither and yon, and is forever offering insights to willing listeners; he appears in Martin Scorsese's seven-part PBS documentary, *The Blues*, scheduled to air this month.

On a steamy July day in his living room—puddles of unopened mail and uncashed checks and a Christmas ornament resting on a breakfront testify that Waterman, a bachelor, still spends a lot of time on the road—he pulls out a favorite print of Son House, father of the blues guitar, and takes a deep breath, as if inflating his lungs with memory: "To see Son House perform. And to see him go to a place within himself that was very dark and secretive and ominous and bring forth that level of artistry. It was as if he went to 1928 or 1936 . . . He just left the building. The greatness of Son House was to look at Muddy Waters or Howlin' Wolf or Jimmy Reed

HARRY BRISCOE

DAVID FRIEND, a former director of photography for Life *magazine, is editor of creative development at* Vanity Fair.

Newport, 1968: B.B. King (b. 1925) reached a widening audience.

Cambridge, 1967: Today Buddy Guy (b. 1936) runs a Chicago club.

Philadelphia, 1970: Mississippi Fred McDowell (1904-1972), Arthur "Big Boy" Crudup (1905-1974) and Williams cavort in Waterman's yard.

Newport, 1965: Hammie Nixon (1908-1984), Yank Rachell (1910-1997) and Sleepy John Estes (1899-1977) got their start in the 1920s.

Boston, 1974: Singer Sippie Wallace (1898-1986) recorded in the 1920s and worked with Bonnie Raitt (b. 1949), right, in the 1970s.

when *they* watched Son House and to read Son House in their faces. They would shake their heads. Buddy Guy would say, 'That old man's doin' another kind of music. We can't even *go* to that place.' If the blues were an ocean distilled . . . into a pond . . . and, ultimately, into a drop . . . this drop on the end of your finger is Son House. It's the essence, the concentrated elixir."

He opens a drawer, and a gust of regret seems to blow into the living room. "I don't show this to many people," he says. He holds up a tray from a photo darkroom. "It's very depressing." In his hand are 150 rolls of film all stuck together, representing some 5,000 pictures from the '60s. "I put them in a closet, and there was some sort of leak from the attic. It filled with water, and the emulsion adhered to the inner sleeves. Many, many, many rolls, gone forever."

Those corroded strips of negatives are like forgotten songs, the ones that somehow never found their way onto a round, hard surface. Hold a sliver of film toward the light and one can discern faint streaks: tiny figures playing guitar. They are irretrievable now. But the blues is about loss, and Waterman has known his share of the blues, including a stutter (which he has overcome), past cocaine use, whirlwind relationships (he and Raitt were an item for a time) and once-simmering feuds with rival managers. He has lost legions of friends to illness and hard living. But if his life has been about anything, it has been about redressing loss and regret through the balm of rediscovery.

Late in the day, Waterman takes a drive to visit the grave of his friend Mississippi Fred McDowell. The photographer steers his old Mercedes out of Oxford, past signs for Goolsby's World of Hair and Abner's Famous Chicken Tenders, past the novelist John Grisham's massive house set amid the horse pastures. The floor of the passenger's seat is awash in junk mail and contact sheets. Within an hour, Waterman is standing in a hillside cemetery in Como, Mississippi, population 1,308. The headstone reads: "Mississippi Fred" McDowell, Jan. 12, 1904-July 3, 1972.

Plastic flowers sprout at the marker's base, where recent visitors have left a silver guitar slide and $1.21 in change. The ash-gray slab, paid for by Waterman, Bonnie Raitt and Chris Strachwitz (the founder of Arhoolie Records), bears lyrics of McDowell's blues classic "You Got To Move": "You may be high, / You may be low, / You may be rich, child / You may be poor / But when the Lord / Gets ready / You got to move."

"You talked to him about funny, stupid, absurd things that just made you pee laughing," Waterman recalls. "Some of the most enjoyable experiences [I've had] were with Fred."

Later, as he heads back to Oxford, a hazy sunset turns the air to taffy. Waterman pops in a cassette, and across the dash comes the thrilling tang of McDowell's slide guitar. Waterman passes families on porches, a tractor in a willow's shadows, children playing dodgeball in the dust. "We're listening to Fred in Fred's country," he says. A tear appears in the corner of his eye. And on he drives. ○

Newport, 1964: Waterman says he photographed Mississippi John Hurt (1893-1966), left, and Skip James (1902-1969) for posterity.

Newport, 1968: Janis Joplin (1943-1970) gave a fiery performance.

Philadelphia, 1964: Son House (1902-1988) "distilled" the blues.

DICK WATERMAN / GOVINDA GALLERY, WASHINGTON, DC

Accident and serendipity played their parts in the inventions of penicillin, the World Wide Web and the Segway super scooter. But as Louis Pasteur once noted, "Chance favors only the prepared mind"

BY KEN CHOWDER

Eureka!

YOU WOULDN'T THINK something as unscientific as accident could have played much of a role in the life of Tim Berners-Lee, the brilliant British physicist and computer scientist who in 1991 invented the World Wide Web. He conceived it and still controls a lot of how it operates from his unimposing office at the Massachusetts Institute of Technology. In 1999, *Time* placed Berners-Lee on its list of the "100 Persons of the Century." No fewer than seven different universities have awarded him honorary degrees.

Tim Berners-Lee sought a way to organize his notes. So he created the World Wide Web. "But I hate spam," he says, and now directs the W3 Consortium, which regulates the Web and combats cyber nuisances.

I.FEBVRE COMMUNICATIONS / MASSACHUSETTS INSTITUTE OF TECHNOLOGY; LWA-PAUL CHMIELOWIEC / CORBIS

But the great breakthrough engineered by this icon of cyberspace did occur, in part, by chance. "There was an element of serendipity," says Arthur Molella, director of the Lemelson Center for the Study of Invention and Innovation at the Smithsonian's National Museum of American History. "At first, he was just noodling around, trying to find a way to organize his research files. So he began to develop a tool just for his own personal use."

The "tool" was a software program that, as Berners-Lee puts it, was "really useful for keeping track of all the random associations one comes across in real life, and [which] brains are supposed to be so good at remembering—but sometimes mine wouldn't." He called it Enquire, and it worked so well, creating effective linkages between huge amounts of information, that it eventually became the basis for the revolution we now casually refer to as the Web. "It would be akin to a carpenter building a little cabinet for himself," Molella says, "and suddenly discovering he could store the entire world inside the thing. There was quite a bit of luck in it."

The element of chance has helped produce many of the most important innovations in modern life. Many are created by it; others become successful because of it, and some fail for the same reason. As Mark Twain, an inventor himself, once scribbled in his notebook: "Name the greatest of all the inventors. Accident." If you don't believe it, go into your kitchen and look around. There might be a Teflon pan on the stove, a microwave oven above it, Post-its sticking out of cookbooks, matches in a drawer; Coke, Popsicles and ketchup stashed in a refrigerator. Accident played a role in their invention.

Happenstance works in many ways. One is the observed event: the "invention" is the way the mind seizes upon an inconspicuous occurrence. The best known of these is Alexander Fleming's role in the discovery of penicillin. One day in 1928 some mold drifted through an open window in a London hospital and landed in Fleming's petri dish, where he'd placed a culture of staphylococcus bacteria. What Fleming did next got him and two colleagues a Nobel Prize in 1945: he looked through the microscope. What he saw was the mold efficiently destroying the germs. Presto! The creation of penicillin began with that unlikely turn of events.

But Robert Friedel, historian of technology at the University of Maryland, cautions that "serendipity is no accident." What's important about an unintended event, Friedel asserts, is the creative way it is used. As Louis Pasteur once said, "Chance favors only the prepared mind."

Any of us might happen to see a cat pull feathers through a birdcage; but when Eli Whitney saw that, he got the idea of how to comb cotton mechanically. Hence the cotton gin. "Some people are just more likely to pay attention when they see something," says Rini Paiva of the National Inventors Hall of Fame in Akron, Ohio. "If you have a certain type of brain, you might see something weird and say, 'Hey, what can I do with this?'"

Take Percy Lebaron Spencer. A hero of World War II for his work in developing radar, Spencer obtained more than 120 patents in his lifetime. One day shortly after the war, he was walking through his lab at the Raytheon Company in Cambridge, Massachusetts, when he stopped briefly by a magnetron—the tube that produces the high-frequency microwaves that power radar. "He was working on things like missile-defense systems," Paiva says. "But just that second he got a strange feeling. He realized that a candy bar in his jacket pocket had melted." Odd, Spencer thought. Immediately, he performed a makeshift experiment: he put some popcorn kernels in front of the magnetron. Soon, popcorn was popping all over the place. "There's actually a drawing of a bag of popcorn in one of Spencer's patents," Paiva says. "Other people might just make a note or two in a lab notebook and let it go. But right away Percy Spencer was thinking about what this could be used for—a microwave oven."

It's not just scientists hanging around high-tech labs whom accident favors. Hans Lippershey, a 17th-century Dutch eyeglass maker, simply happened—so the story goes—to look through two lenses one day and notice that objects at a distance were greatly magnified. When he put the lenses in a tube, he created the world's first telescope. John Walker was a pharmacist, not a scientist. One day in 1826 he was mixing potassium chlorate and antimony sulfide together with a stick, but the mixture stuck to the stick. When he tried to scrape the stuff off against the stone floor, it burst into flames. Walker quickly produced for sale the first friction matches, or, to use his catchy name, "sulphuretted peroxide strikables."

Inspiration can take a lot longer to strike than a match. Frank Epperson was an 11-year-old boy at the dawn of the 20th century when he accidentally left a mixture of soda powder and water out on the back porch one cold night. In it was the stick he'd used as a mixer. Next morning, Epperson found the soda water frozen around the stick. Nearly 20 years passed before he realized that by adding some flavoring, he could concoct a frosty treat, and with that he began to manufacture what he called "Eppsicles." Eventually the name changed, and he earned royalties on more than 60 million Popsicles. (That success inspired the creation of the Fudgsicle, the Creamsicle and the Dreamsicle.)

A chocolate bar in his pocket melted by radar gave Percy Spencer (above) a vision: microwave ovens. In 1973 Frank Epperson's granddaughter Nancy helped celebrate 50 years of his "frozen drink on a stick."

RAYTHEON COMPANY; ANTHONY MESHKINYAR / GETTY IMAGES; BRIAN HAGIWARA / GETTY IMAGES; BETTMANN / CORBIS

Sometimes Lady Luck delivers the invention but not the fortune that should go with it. One day in 1839, a failed hardware salesman was tinkering at his boardinghouse in Woburn, Massachusetts. He'd been hauled off to debtor's prison so often that he called it his "hotel." Even there, he kept doing experiments, doggedly trying to make a useful material out of a substance from Brazil called rubber. People bought it for erasing—"rubbing" out mistakes. Because it became brittle in the cold and melted in high heat, that was about all it was good for. The amateur inventor tried mixing it with numerous chemicals all without success, until that day in Woburn when he blended rubber with sulfur—and happened to drop the mixture onto a hot stove. After he cleaned it up, he realized that the rubber had suddenly become more solid, yet was still flexible.

Charles Goodyear had vulcanized rubber, a process that gives it useful properties, such as strength, elasticity and stability. (Today it is used in everything from automobile tires to golf balls.) But that practical discovery did little to help Goodyear himself. His many patents were regularly violated; when he died in 1860, he was more than $200,000 in debt.

In one common scenario, inventors are hard at work trying to make one thing when accident intervenes to create something else. The first practical synthetic dye was "invented" when an 18-year-old student in London was trying to synthesize an antimalarial drug; the material that led to throwaway tissues was first intended as a filter for gas masks.

In the late 1960s, 3M Company researcher Spence Silver was trying to create a superglue but ended up with the opposite—a glue that wouldn't dry, wouldn't melt and hardly stuck to anything. It could just barely hold two pieces of paper together. What the devil could he use the stuff for? Silver never did come up with a good answer, but five years later a fellow employee, Art Fry, began using the glue on small scraps of paper, making bookmarks for his church hymnal. It took another eight years before "Post-it" sticky notepaper became an overnight sensation.

Another everyday accessory we all take for granted, Teflon, has been called "the greatest accidental invention of the century." In 1938, a 27-year-old chemist, Dr. Roy Plunkett, was working with technician Jack Rebok at Dupont's Jackson Laboratory in Deepwater Point, New Jersey. Plunkett was trying to create a new kind of refrigerant by mixing a gas called tetrafluoroethylene (TFE) with hydrochloric acid, but one April morning something went wrong.

Plunkett had stored several canisters of TFE on dry ice, to prevent the gas from exploding. When they opened the valve on one of the canisters, nothing came out. They removed the valve, turned the cylinder on its head and shook it. This time something did come out—a white waxy powder.

"What the hell is going on, Doc?" Rebok blurted out.

What was going on was this: the TFE gas had frozen and transformed into a solid, coating the insides of the canisters. TFE's simple molecules had combined into long, elaborate chains, forming the giant molecules of a new substance with bizarre, almost unimaginable traits. It was inert to virtually all chemicals, which made it the most slippery material in existence. That slipperiness has proved tremendously useful. Teflon has been incorporated into bomb fuses, clothing, space capsules, heart valves and, of course, one conservative U.S. presidency.

At times, serendipity has provided the motivation for invention rather than the invention itself. The switching system that led to the dial telephone, for example, was invented in 1888 by an undertaker with a problem. Almon Strowger's Kansas City funeral parlor was losing out to a competitor with an unfair advantage. The other undertaker's wife was a telephone operator, and since every phone call had to be placed by an operator in those days, the other undertaker's wife was usually one of the first people in town to hear about a death. Then her husband would phone the bereaved to offer his services. This unfair marketing advantage called for action, but the only solution Almon Strowger could come up with was to eliminate the problem—the operator. So to replace human intermediaries, he invented electromechanical switches to direct calls.

Some might argue that Strowger's invention wasn't really so serendipitous because the dial telephone

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Overshoes turning into smelly, useless blobs on hot summer days spelled trouble for the nascent rubber industry. Then, in 1839, Charles Goodyear stumbled upon a way to make rubber strong yet flexible. Even so, he would die deeply in debt.

BETTMANN / CORBIS; RYAN MCVAY / GETTY IMAGES

"Wow, Isn't That Cool!"

Segway inventor Dean Kamen says when the lightbulb in your brain goes on, you may not even see it – BY MAX ALEXANDER

DEAN KAMEN, who invents 21st-century gizmos in a 19th-century factory building, looks out the window of his corner office at the Merrimack River, four floors below. The river is why this building is here in Manchester, New Hampshire: water powered the mills that made this place a textile center more than a century ago. The town prospered, but the hydropowered mills are long gone. Nowadays the city is a financial center, and rush-hour traffic backs up on bridges crossing the river, a condition that Kamen's latest creation, the two-wheeled Segway Human Transporter, might someday help alleviate. It is the result—like most things Kamen comes up with—of his insistence on avoiding assumptions.

"If I asked a 5-year-old kid, 'Can you jump in that river?' he would reasonably say, 'I don't know, are you allowed?' He would assume, unless otherwise told, that there was a rule." Kamen, 52, isn't leading up to a neoconservative rant about excessive government regulation, although he could probably go there. His point is that our world has become so complex and organized that people expect to be told everything. "Today," he says, "most 'research' involves going to the Internet and looking for an answer to the problem—as opposed to sitting down and inventing an answer."

It's unlikely that Kamen was sitting down when he and his colleagues invented the Segway or the iBot wheelchair replacement or the portable dialysis machine or the improved heart stent, like the one in Dick Cheney's chest, or any of the hundreds of other patents his company holds (and zealously guards). When he is obligated to take a seat—such as during an interview—he skywrites with his arms, jabbing fingers up (good point) or down (bad point), and making vertical and horizontal karate chops that categorize ideas into air squares. Physically slight, Kamen wears blue jeans and a pressed blue-denim shirt with the company logo (a figure called the "Fly Guy," zipping along as if on a Segway) embroidered tastefully above the pocket. He has never been accused of being a shrinking violet. In *Code Name Ginger*, a new book about the development of the Segway, Steve Kemper, a regular contributor to SMITHSONIAN, quotes Bill Clinton: "If you do not want to hear about what [Dean Kamen] does, do not ask or stand within a four-mile radius."

But Kamen does much more than try to sell you on his line of whizbang products. He is a one-man band banging the cymbals of scientific innovation, which he insists can only happen when people teeter at a cliff. "Most people define success as a lack of failure," he says. "But if you start to do things you've never done before, you're probably going to fail at least some of the time. And I say that's OK. Thomas Edison said he never failed; he just found 14,000 ways not to build a lightbulb."

Instinctive rebalancing during a slip in the shower gave Dean Kamen, 52, gyroscopic ideas: a wheelchair replacement that climbs stairs and allows users to "stand" upright, and the much-ballyhooed Segway Human Transporter (above).

Kamen has been compared to Edison and Henry Ford. His Segway, which carries a standing person along at up to 12.5 miles per hour and takes most people only a few hours to master, may or may not prove as enduring as the lightbulb or the horseless carriage, but Kamen does fit the mold of those inventor pioneers. Born and raised in Rockville Center, Long Island (his father, Jack, was a comic-book illustrator), Kamen was a prototypical nerd who preferred tinkering with electronics to kicking footballs. In his teens and early 20s, he designed light shows for museums and local rock bands. At Worcester Polytechnic Institute in Massachusetts, he invented the first wearable drug-infusion pump, which freed nurses from constantly monitoring IV hookups. In 1979, he dropped out of college and set up shop in New Hampshire because he liked the state slogan, "Live Free or Die," and its absence of income tax.

Like Edison, who said that genius is 98 percent perspiration and 2 percent inspiration, Kamen downplays the revelatory side of invention. In reality, he says, the process is so "blindly frenetic" that when the lightbulb in your brain suddenly goes on, you may not even see it: "You get this spaghetti bowl of paths and dead ends and changes in perspective

MARK PETERSON / CORBIS SABA

and requirements and expectations, and sometimes you're lucky and you end up at the intersection of a technology that's right and works, a need that's recognized and real, and the capability to deliver something that people will accept. And when all of these things intersect—wow, isn't that cool!"

Take the Segway, which grew out of Kamen's development of the iBot. The initial goal was a wheelchair that could negotiate steps and curbs. "I just thought the existing wheelchair was a pretty inadequate solution," says Kamen. "There's gotta be major room for improvement here, and I started to think it would be easy."

So Kamen, chairman of DEKA Research & Development (as in DEan KAmen), and his engineers started brainstorming: "We thought, well, when the wheel hits the curb, it will deform to the shape of the curb—we have all sorts of exotic new materials—or we'll make a mechanical linkage that can do this." When nothing panned out, Kamen ran a search of every wheelchair patent in existence.

He found a lot. "Most of these patents were from what I call the Golden Age of Gizmology," recalls Kamen, "the late 19th and early 20th century, when really smart, creative people invented mechanical adding machines, or printing presses or jukeboxes—things that today we easily do with software. I looked at this huge pile of ingenious wheelchair mechanisms, and I realized that if all those guys, with all those patents, didn't come up with any gizmo that was better than what we have today with wheelchairs, then I probably won't either. . . . That's when we really focused on finding a way to understand human balance." The solution was electronic gyroscopes that "think" like the inner ear, adjusting movement to account for terrain. The result was iBot, a four-wheeled, motorized wheelchair that can climb stairs.

From the work on iBot sprang the Segway. "Once we were able to make devices that essentially mimic human balance and walking," he says, "it wasn't that big a leap to take the seat off. Then it becomes something that is just plain fun. . . . Put [people] on this, and it's like giving them magic sneakers."

Kamen the businessman hopes the Segway, which came on the market last November after a decade in hush-hush development, will become as essential as the car or the telephone. But it costs $4,950 in a weak economy, and Kamen the inventor takes the long view. "I don't believe necessity is the mother of invention," he says. "Most people don't get up in the morning and assess what their needs might be. When you first see a Segway, you might say, 'Jeez, I got along my whole life without it, what would I do with it?' But you've constructed a life where you only walk distances that you can walk in a few minutes, and otherwise you get in your SUV. If you had one of these"—he points to the Segway, plugged in and silently charging, near the door of his office—"suddenly your neighborhood might not be one or two blocks, but the whole downtown. Would you then change the pattern by which you make certain decisions and do certain things? People will adopt the technology not to do what they already were doing, but to do something they couldn't have done." Kamen the salesman is in high gear, but he catches himself, sighs, and adds, "That process takes time."

"Thomas Edison said he never failed," observes Kamen. "He just found 14,000 ways not to build a lightbulb." A successful invention, he adds, is the result of good technology and luck. In June, the 43rd and 41st presidents took a spin on Segways.

JIM BOURG / REUTERS

Kamen doesn't discount the importance of software engineering, but he's no silicon geek. The Internet is not nearly as amazing as the telephone, he says, and computers inspire him about as much as the post office: "There is no fundamental engineering inside a computer that isn't the same as an abacus."

So what's his idea of a really nifty invention? "The toilet," he says instantly. Although toilets operate on the simple principle of a siphon, says Kamen, "there are not too many people who can give a plausible explanation why the water in a toilet will stay at this height, and if I make it a little higher, it goes all the way down, then it comes back up. There is no valve! I mean, it's such an elegant solution."

Kamen, who is single, likes to curl up at home with a good treatise—say, Newton's *Principia*. "Each time you think you really know electricity or magnetism or relativity and you try to redo that proof yourself, it's hard," he explains. "How did he get from here to there? Did he *really* prove such and such?" These are the kinds of questions that keep Kamen awake at night—when he's not worrying about whether Ford or Honda is ripping off his Segway. "I would be very concerned if somebody was about to come out with a device that had equal or better performance," he says gravely. But then he laughs. "Of course, I'd be equally concerned if there weren't a lot of people *trying*."

MAX ALEXANDER, a former editor at People *magazine, is currently writing a book about life on his farm in Maine.*

CONTINUED FROM PAGE 94

was bound to come along sooner or later. But was it? Not according to Judith McGaw, a historian who specializes in American technology. "No reputable historian of technology would argue that inventions are somehow destined to happen," she says.

Although the need for an invention can seem quite obvious, it usually doesn't appear so until after the fact. Mark Twain, who patented such far-from-obvious devices as an "Improvement in adjustable and detachable straps for garments," once put it this way: "The man with a new idea is a crank until the idea succeeds."

Indeed, some of the most consequential inventions in history were dismissed as the brainchildren of cranks. Thomas Edison once thought that his own great coup, the phonograph, had little commercial value. In 1876, an executive with the Western Union Company declared that "this 'telephone' has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us."

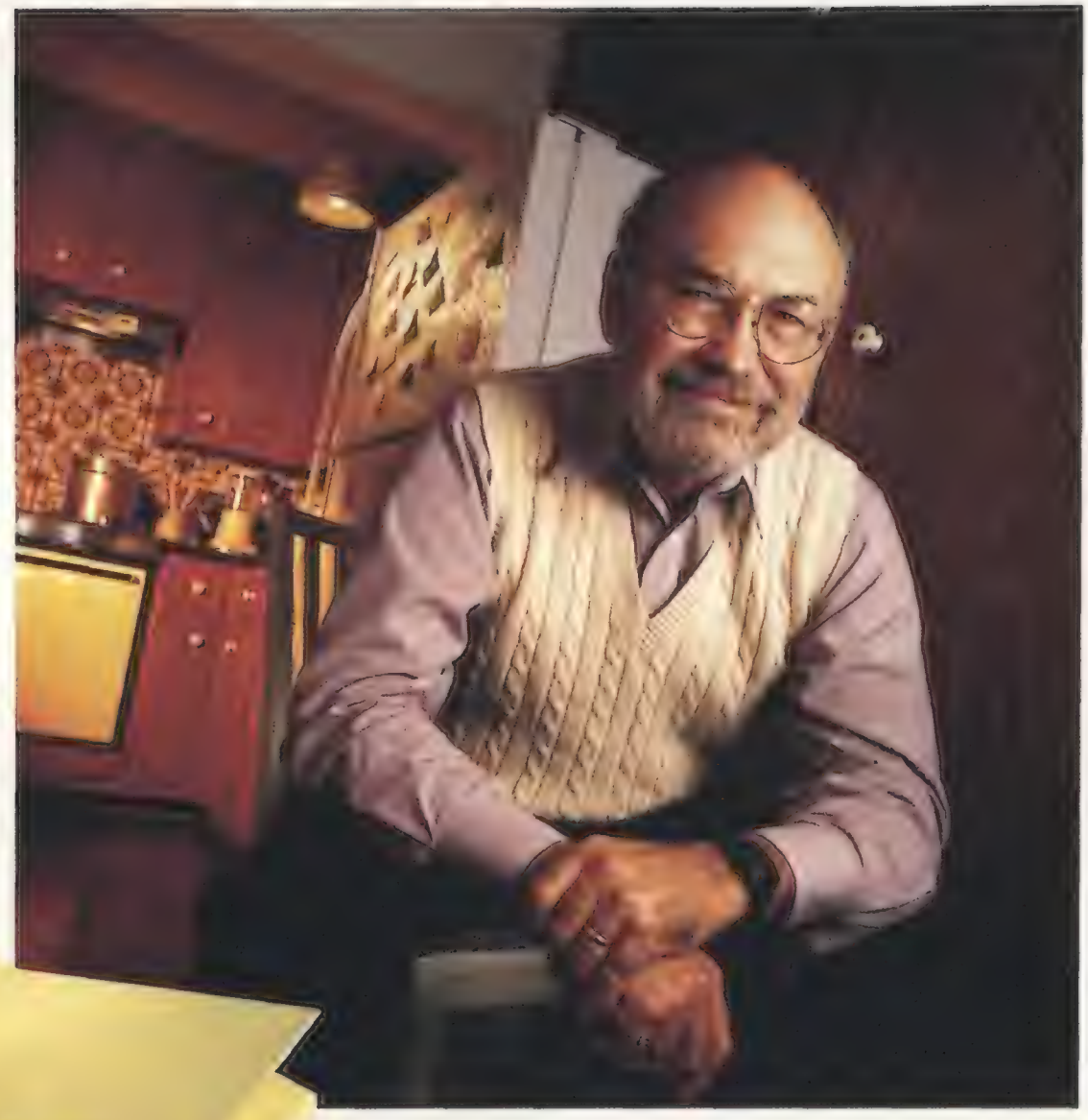
What about putting sound into movies? Harry Warner of Warner Brothers was epigrammatic in his misjudgment: "Who the hell wants to hear actors talk?" he said.

As for television's prospects, Darryl F. Zanuck of 20th Century Fox claimed in 1946 that TV "won't be able to hold any market after the first six months. People will soon get tired of staring at a plywood box every night." Even as late as 1977, the president of Digital Equipment Corporation avowed, "There is no reason anyone would want a computer in their home."

Or, take Xerox machines. In 1938, Chester Carlson got tired of making copies with carbon paper. In his makeshift laboratory in Queens, the New York patent agent came up with a way to make copies automatically and took his invention to IBM. People wouldn't want to use a "bulky machine," the wise men at IBM said, when they could use carbon paper. Of course, the process Carlson invented, xerography, continues to churn out billions of copies yearly.

"There tends to be a cleaning-up of the record," says Arthur Molella. "People like to say, 'Yeah, we knew it all along.' They put the best face on it, in hindsight. But the world is full of chance."

In such a world, timing is everything. A great discovery can turn into a spectacular flop if it has the misfortune to come along at the wrong moment. Take the amazing VideoHarp, for example. Chris Patton, a 52-year-old composer and musician who lives in Silver Spring, Maryland, says he is "the first professional VideoHarp player in the world . . . and also the last." Made of amber Plexiglas and black aluminum, the instrument straps over his shoulders like a futuristic accordion. It responds to the movement of Patton's hands, using a system of mirrors and optical sensors to translate light and shadow into synthesized music.



A dull sermon got a 3M researcher and church choir member thinking about a nagging problem: the scraps of paper he used to mark his place in the hymnal kept falling out. Years before, his colleague Spence Silver (above) had developed an adhesive too weak to be of much use. What to do with it? Voilà. Boredom gives birth to Post-it notes.

The VideoHarp was created in the late 1980s by South Carolina inventor Paul McAvinney and his grad student Dean Rubine. Only eight instruments were ever made. "The main problem was a sudden scarcity of optical sensors," McAvinney says. "Because of that, a VideoHarp ended up costing $9,000—too expensive for the market." Today sensors are both plentiful and cheaper, so McAvinney could make a better VideoHarp for much less. "But by now my resources are pretty well drained," he says with a sigh. Still, McAvinney has faith that the future may have an accident or two up its sleeve. "Who knows?" he says. "With a little luck, maybe someday they'll be playing VideoHarps on the shores of a distant planet." ○

KEN CHOWDER says his living in Denmark is accidental. He has written three novels and more than 20 documentary films.

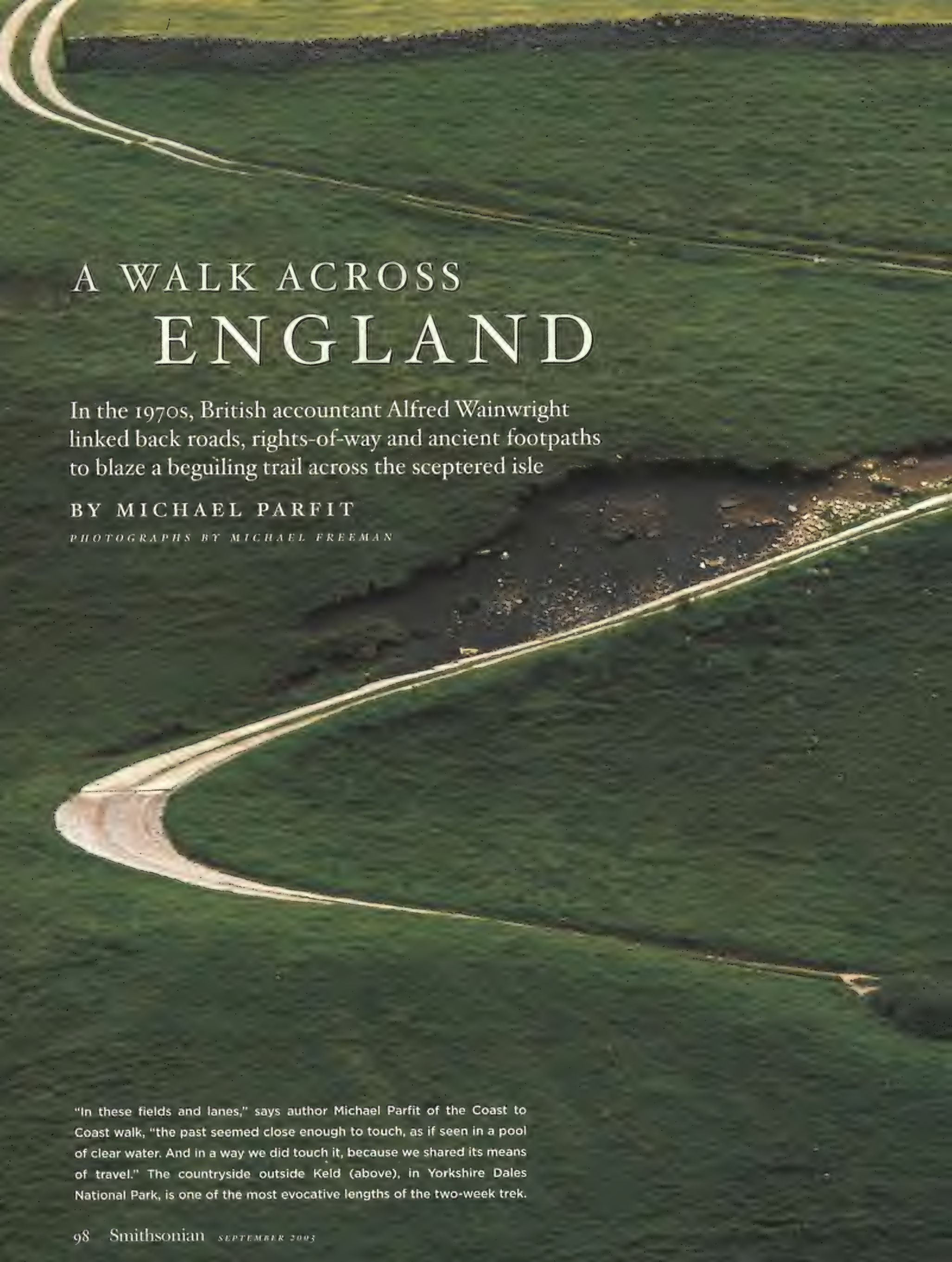
JIM WES THOMPSON / CORBIS

A WALK ACROSS ENGLAND

In the 1970s, British accountant Alfred Wainwright linked back roads, rights-of-way and ancient footpaths to blaze a beguiling trail across the sceptered isle

BY MICHAEL PARFIT

PHOTOGRAPHS BY MICHAEL FREEMAN



"In these fields and lanes," says author Michael Parfit of the Coast to Coast walk, "the past seemed close enough to touch, as if seen in a pool of clear water. And in a way we did touch it, because we shared its means of travel." The countryside outside Keld (above), in Yorkshire Dales National Park, is one of the most evocative lengths of the two-week trek.

When an English accountant named Alfred Wainwright first went to the lonely hills of northern England in 1930, he was a lonely man. But the cool, empty vistas of moor and mountain must have soaked up his own emptiness like a sponge, because the hills were where he found love.

Today, many people walk in the footsteps of Alfred Wainwright, whose passion for the mountains turned him from accountant into author. The reason is simple: Wainwright, who died at age 84 in 1991, wrote a series of guidebooks to walks through the wildest landscapes in Britain. One book in particular created a now-famous route through heather and woods, over stiles, past lakes, among sheep and across ridges in the face of horizontal rain, from one coast of England to the other.

The route is called the Coast to Coast. It's a walk through history and time, across an England that seems not to have changed in hundreds of years. But the trip is also a journey of companionship, and the most familiar friend is Wainwright himself, who walked alone.

Recently, my wife, Suzanne, and I decided to follow in his footsteps. As it was for Wainwright, it was a map that first intrigued us. "Give me a map of country I do not know," he wrote, "and it has the power to thrill and excite me."

The maps he made of the Coast to Coast walk are wonderfully appealing, with intricate dotted route and contour lines, bushy marks for bogs, notes for gates and barns, alternate routes to mountains (called fells), and drawings of outcrops, tarns (lakes) and waterfalls. Wainwright said he began making maps so that by looking at them, he could "go on fell walking in spirit long after my legs had given up." He didn't know that it would not be his legs that would betray him in the end, but his eyes.

As we looked at the maps at home, they showed a long wriggle of a route, starting in northwest England at the village of St. Bees on the Irish Sea and leading out into delightful imaginary distances, through three of Britain's finest national parks, to the village of Robin Hood's Bay, 190 miles away on the North Sea. But at the start of our walk, on a cool morning under a gathering overcast, the maps suddenly turned real and the distances long.

We began, as most walkers do, in St. Bees. We had been planning the trip for more than a year, delayed by the scourge of foot-and-mouth disease, which roared like wildfire through this part of Britain, closing trails and leaving farm and tourist economies in shambles. But now the fields were clean and the gates were open. We stood on an expanse of low-tide beach and, as Coast to Coast tradition demands, let gentle little Irish Sea waves wet the soles of our boots.

After a magnificent first five miles along sea cliffs, among sounds of waves and gulls, we walked up a quiet lane into the village of Sandwith. It was like many of the villages we would soon encounter: a cluster of white cottages, two pubs, a patch of green with a picnic table, and a farm road leading east. It felt as if we had already shed the hasty part of time and were immersed in Britain's ancient, slower flow of days and hours in which all travel moved at the pace of feet or hooves, and the space between villages was set by the distance a person could walk in a day.

"Coast to coast, are ye?" said an elderly man with a cane and a collie as we walked into Sandwith. "Going to do it all?"

"Yes," we answered.

"Oh," he said, shaking his head. "You'll be tired." He reached into his pocket and gave us a roll of mints.

Both sobered and fortified, we set off toward green hillsides, now shrouded in rain, and started uphill. Soon it became steep and slippery. "Never believe Wainwright when he says 'gentle climb,'" another walker wrote in a guest book we saw later in a hotel in Robin Hood's Bay.

Alfred Wainwright's vocation perhaps explains the tidiness of his many guidebooks and his occasional grim understatement. He was born in 1907 and raised in the gritty textile city of Blackburn, northwest of Manchester. In 1931 he married a woman named Ruth Holden, who worked in a textile mill. They had a son, whom they named Peter, but the couple had little in common, and they soon ran out of even friendship. "He had ruined her life," Wainwright wrote in a short story that was clearly autobiographical, "just as surely as he had ruined his own." A.W., as he preferred to be called, began to indulge in dreams of one day finding a different—and perfect—female companion he termed "she whom he loved." But the romance he found was with a place, and it was decidedly not comfortable: the mountainous north of England.

On the ascent from the west, A.W.'s guidebook told us as our pace slowed in the first climb, "it is the sudden revelation of the Lakeland fells that rivets the attention." For him the

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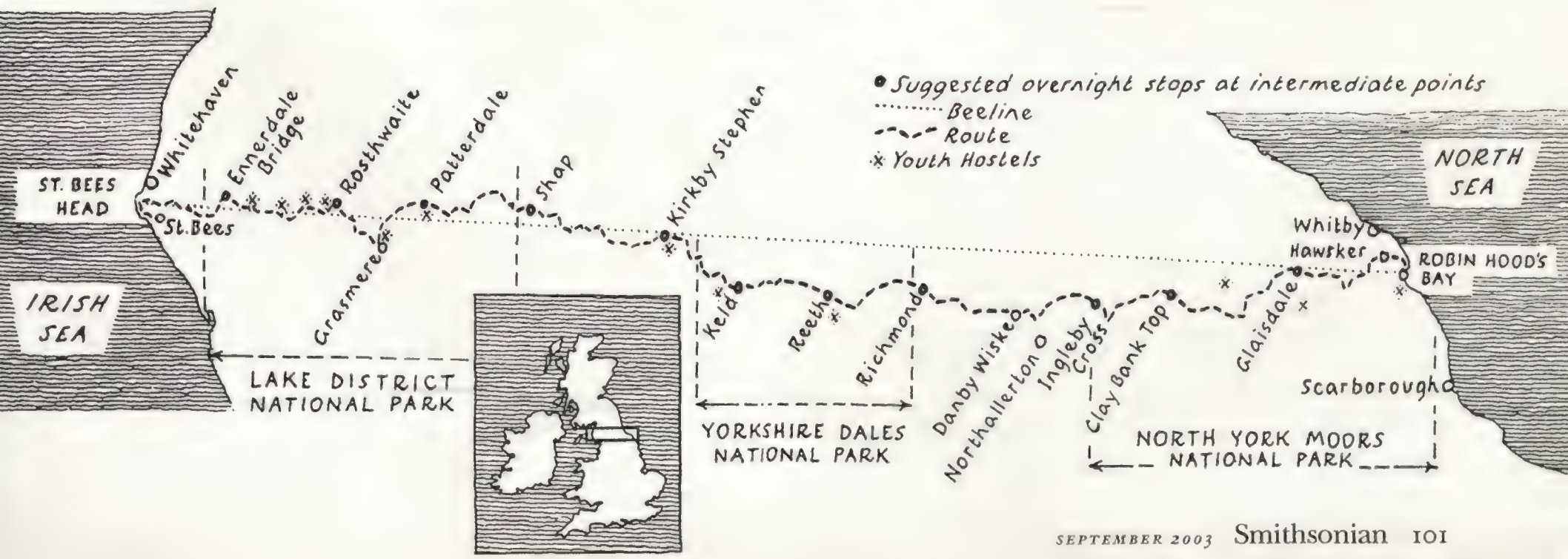
Writer and filmmaker MICHAEL PARFIT *has hiked trails on five continents, from Antarctica to Australia. This is London-based photographer* MICHAEL FREEMAN'S *45th story for the magazine.*

DERRY BRABBS; *P.101 ROUTE MAP:* A COAST TO COAST WALK: A PICTORIAL GUIDE, BY A. WAINWRIGHT, MICHAEL JOSEPH LTD (LONDON), 1992

"One should always have a definite objective, in a walk as in life," Wainwright (opposite, in 1986 in his beloved Lake District) wrote in his Coast to Coast guide. "It is so much more satisfying to reach a target by personal effort than to wander aimlessly." Growing up in a dreary industrial town, where he dreamed just "to live in a house with a garden," Wainwright was enchanted by mountains. Though climbing Helvellyn would add two hours to the walk, he urged his readers to do so for its "extensive view and the exciting traverse of Striding Edge" (above). Following Coast to Coast tradition, author Michael Parfit and his wife, Suzanne (right), wet their boots in the Irish Sea at the start of their trek in St. Bees. Wainwright's map (below) traces the cross-country route.



The journey begins, Wainwright wrote, along "the lofty bulwark" of St. Bees Head (left), "four miles of towering and precipitous cliffs of red sandstone." The setting of the Lakeland village of Grasmere (right), he said, is "endowed with sylvan grace and dignity."

introduction to the Lake District, when he came here for a week's holiday in 1930, riveted his whole life to the fells. "I saw mountain ranges," he wrote, "one after another, the nearer starkly etched, those beyond fading into the blue distance. Rich woodlands, emerald pastures and the shimmering waters of the lake below added to a pageant of loveliness. . . . "

For us the pageant of the first park, Lake District National Park, was limited and wet. We had walked into what a 60-ish, shirtless British hiker later told us was "a bit of heavy dew." In other words, ropes of rain.

We wore full rain gear, but as the shirtless Brit might have said, we were nevertheless a bit damp when we climbed a sodden hillside after a walk of 13½ miles and arrived at a bed-and-breakfast called Low Cock How Farm. A long white building with a dripping slate roof and four tractors in the front yard, the establishment was pleasantly crowded with 11 other equally wet walkers. Their clothing and ours soon festooned the place, hanging from nails in beams near the fireplace. But the baths were enormous, the hot water abundant and the company congenial. In one of the bathrooms we found a bottle labeled "M-R Muscle Embrocation. Ideal for Horses and Dogs." It was nearly empty.

In the morning, we partook of a vast English breakfast of cereal, eggs, bacon, broiled tomatoes, beans, toast and marmalade—a breakfast that would be presented at every B & B—then set off again. The previous day's rain had seemed geological, something so massive and permanent it would require an earthquake to dislodge, but as the morning progressed, the sun roared like a British lion and dispersed the clouds in fleeing shreds. Now we stepped full-on into the pageant.

Both sky and land were tumultuous. As we walked out of a forest, dark mountains rose and silver water fell, mixing white sound with the wind. The first lake of many, Ennerdale Water, stretched out before us, a blue pool under the treeless slate-and-granite ridges of some of the Lake District's more famous mountains: Red Pike, Pillar and Haystacks.

"Lakeland means, to most visitors, not lakes but mountains," A.W. wrote in his Coast to Coast guide. And indeed it is the high country, clothed only in patches of bracken and heather, that gives the whole district its definitive aura of openness and freedom.

The trails of the Coast to Coast run through private land as well as public parks, following back roads, rights-of-way across fields, and ancient footpaths between towns. This access is jealously guarded by several organizations, including the Ramblers' Association, which recently helped push through a national law to open millions of acres to walkers by establishing new rights of access to uncultivated land.

Continuing on, we reached a high slope and looked back along the ridge at the heap of rock called Haystacks. Beneath it was a gleam of water called Innominate Tarn, A.W.'s favorite spot on earth. "A quiet place, a lonely place," he wrote of the lake. "Where the water gently laps the gravelly shore and the heather blooms and Pillar and Gable keep unfailing watch."

After 21 years working his way up in the ranks at the Blackburn Town Hall, Wainwright followed the lure of the mountains and got out of industrial England. He took an accounting job working for the quiet Lakeland town of Kendal and moved there with his family. Although his marriage was still intact, it was, according to his biographer, Hunter Davies, miserable. But the move was not.

"I am a lover come back to his first and best love, and come to stay," he wrote a friend. "Nobody here knows me, yet I am surrounded with friends: the tall trees by the river, the enchanting path over by the castle, the birds and the squirrels in the wood; and all around me, most faithful and constant of all, the unchanging hills."

As we followed Wainwright's directions over his unchanging hills, we got to know his gruff and idiosyncratic side (the part that fed his curmudgeonly reputation), as well as

"Pleasant walking," said Wainwright, "follows through walled pastures" at Ravenseat (left). "Little has changed here for generations," he wrote, of the small cluster of stone buildings in Keld (right). Wainwright sketched the ruins of Shap Abbey (below) in 1969.

his often sardonic sense of humor.

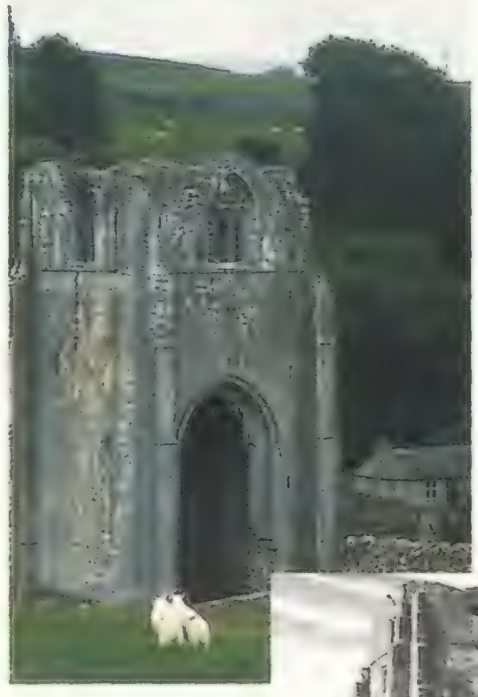
This will seem "the dullest section of the walk," Wainwright wrote of a stretch of the route approaching Whitwell Moor. "Those who believe the Earth is flat will be mightily encouraged in this section. . . . Verily a slough of despond."

"Before proceeding beyond the tarn," he warned of Lakeland's Grisdale Pass, "sit down awhile and consult (a) the weather, (b) the time, (c) the state of the blisters. . . . "

Aye, there's the rub. By the time (three days and 38 miles into the walk) we got to Wordsworth's "dear vale" of Grasmere, the town where the poet lived for 14 years, blisters and knee pains from steep descents had made the journey less enchanting. We each bought blister remedies by the boxload and a pair of lightweight hiking poles and set off again.

We had become part of a small moving community of people who had all started in St. Bees about the same time. It included a group of five superhiker Australian women, who quickly disappeared ahead to be tracked only in B & B guest books; a pair of sweetly happy British honeymooners, who disappeared languidly behind; a New Zealand couple with blisters at least equal to ours; two anonymous women from the Seattle area; Helen and Richard Lupton from British Columbia; Roger and Joanna Garrett from Michigan; and a solitary but gregarious Irishman named Paul. We learned of some members through gossip only. A man from the Netherlands named Piet, quickly nicknamed the Flying Dutchman, passed among us like a ghost, said to be cruising 25 miles a day. We also heard a rumor that somewhere out there were celebrities: two past British tiddlywinks champions.

We were walking ever deeper into British history, surrounded by prehistoric standing stones; Roman forts; names like gill (which means ravine or stream) and fell, both left by the Vikings; and stone fences from the 18th century. A framework of the walker's old-fashioned kind of time settled around us, made of barriers as solid as the fences: limits of distance, stamina, energy, daylight, weather and knowledge of terrain.



In this mood we came upon a long straight path on a ridge. It was the remains of a Roman road now called High Street, which lies along a broad-backed mountain of the same name. The road was probably built in the first century A.D., and even after 2,000 years it retained the authority of empire. We might have imagined joining a clanking company of Roman soldiers, except they'd have shamed us. Their rate of march even in the mountains is said to have been about 18 miles in five hours. We, on the other hand, were hard pressed to go half that speed.

Lakeland let us go brutally, with a steep descent—"hard going," A.W. wrote in his guide—agonizing to knees and blisters. He hinted that mountain lovers might prefer to stay in Lakeland's lofty magnificence "and be damned to the Coast to Coast walk." If you don't continue, he said, "no hard feelings. You'll think of something to tell the folks at home." But, he went on, you "could have regrets. And (let's be clear about this) you can't expect to get your money back for the book."

Set up for scenic anticlimax, we found, instead, that the landscape opened out in the distance toward the magnificent

ILLUSTRATION: A LAKELAND SKETCHBOOK BY A. WAINWRIGHT. WESTMORLAND GAZETTE (KENDAL), 1969

A short detour from Keld, Thwaite (left) is in Swaledale, a region long sustained by lead mining. Of Richmond (right), Wainwright wrote: "Rich in relics of the past." Doreen Whitehead (below, with pet goat) runs a B & B in Keld, but has not walked A.W.'s route.

long ridges of the north edge of the Yorkshire Dales National Park. Here, trails and country lanes led between deep green pastures and along streams in the shadows of oak trees, and after the climbs and descents of the mountains, the gentleness of terrain turned us from hikers back into walkers.

The terrain was gentle, but the history was not. The human presence here goes back at least 11,000 years, and the oldest known artifact is a harpoon. Shapes in the hills reveal forts and graves. Power ebbed and flowed through the centuries, from the warlike tribes called the Brigantes, to the Romans who fought them, then later to the Danes and Vikings. When the Normans arrived in 1066, they engaged in what is now described as ethnic cleansing. Later, they gave vast estates to the church, in order, one author writes, to ensure "a safe passage, after a sinful life, to heaven." So wealth and power came to be vested in churchmen, who built farms and estates centered around abbeys.

As we reached the town of Shap after a long day, we passed the ruins of Shap Abbey, which was founded in 1199. The remaining structure stands quietly near a stone bridge, among sheep, its power yielded to a more secular world. The Hermitage B & B, where we stayed the night, is relatively new: the year 1691 was written over the front door. "There is a sense of sanctuary here," said proprietor Jean Jackson, who's seen many "Coasters" stagger to her door. They have impressed her with their, well, individualism. "People are peculiar," she said, "in the nicest ways."

The owners of our next B & B, the Jolly Farmers, in the town of Kirkby Stephen, told us of opening their door, on more than one occasion, to people who immediately burst into tears. I can understand. The leg between Shap and Kirkby Stephen turned out to be a tough 20 miles through a steeply rolling landscape, made more difficult for passing near, but not near enough, a chocolate factory. At least the weather was good; during wet and muddy periods, the proprietors of the Jolly Farmers have been known to stop their guests on the doorstep and hose them down like sheep.

As we moved on from Kirkby Stephen, the miles slipped past more swiftly, just as the years—filled with hikes, work and a tedious marriage—had slipped past Wainwright. Then, in 1952, his life changed. In that year he began a series of seven guidebooks to the fells of Lakeland, drawing each page by hand, including intricate sketches, maps and text. "I don't think anybody since the days of the monks had ever produced a completely handwritten book," his printer told his biographer. A.W. went into debt to publish the first of these, *The Eastern Fells*, in 1955. By the time the seventh came out in 1966, the series had become a great success. But it wasn't until 1973 that he published *A Coast to Coast Walk* and, with it, scratched his own signature across Britain.

"A sundial records the hours," says the Coast to Coast guide, "but time is measured in centuries at Keld." For us it had been a short day: 12¾ miles from Kirkby Stephen. In Keld, an ancient little town on a hillside, we met Doreen Whitehead, author of a well-known bed-and-breakfast guide to the walk, who had known Wainwright.

"I think he was a kind man at the bottom of him," she said. "He brought a lot of prosperity to these little villages." A.W. had a reputation for being gruff and abrupt, but Whitehead dissented; he'd always taken the time to talk with her.

The next morning we walked through an extraordinary

Tiddlywinkers Charles Relle (above, at left) and Alan Dean walked the 190 miles to Robin Hood's Bay (right). "Now you can rest on your laurels in the Bay Hotel with a pint," Wainwright told finishers, but "no use saying 'charge it to Wainwright.'. . . Pay for your own. I'm skint."

landscape of ruined stone buildings, torn earth and holes in the ground. These were old lead mines, where, starting in the 16th century, thousands of men had dug out ore until the industry collapsed in the 1880s. Not far from a monumental ruin of a smelting mill called Old Gang, about 15 miles from the city of Richmond, the fabled tiddlywinks champs turned up. They were Alan Dean, wiry and lean, and agile across the hilltops, and Charles Relle, tall and broad, and desperately afraid of heights. Alan and Charles were peculiar in the nicest sort of way. "All tiddlywinks players are odd," Charles said when we had dinner with them a couple of days later. "You're expected to be odd," added Alan.

The notion of serious adult competition in the game of tiddlywinks, which involves flipping coin-size pieces of colored plastic into a small cup, was dreamed up in the mid-1950s by a group of students at Cambridge who wanted to hack into some of the respect given athletes. Now here were two champions from the 1970s tramping the Coast to Coast with a rolled-up tiddlywinks tablecloth, playing a match in a pub every night. We arranged to meet the pair in two days for a game, and with that in mind, Suzanne and I marched off into the longest—and according to A.W., the most boring—day.

"You have heard of Yorkshire's broad acres," he wrote in the Coast to Coast guide. "Here they are in person, interminable. . . . " But we continued to find the route charming, bucolic and friendly. We even enjoyed Danby Wiske, where A.W. vented his spleen at a town he said "is less attractive than its name. . . . You are tired and hungry but nobody wants to know. . . . "

We stopped at the White Swan Inn and pub, all white walls outside and dark wood inside. The proprietor, Frank Phillips, was very familiar with A.W.'s cantankerousness, but forgave him genially. "Wainwright just didn't like the plain between the mountains," he said. "He didn't get a good reception when he got here." Phillips laughed. "Things have changed. I want them to bring the books up to date."

We pushed on. "Left, right, left, right," A.W. writes, testily. "It is better to stick to the road . . . and get on quickly." The route followed country roads more than trails, but often broke away to take rights-of-way through farms. One was a free-range chicken farm, with thousands of the birds hunting avidly through the fields. Right and left, they strutted up to us with an aggressive air, which made me wonder what would happen if one of us tripped and fell. Would they swarm and peck us down to bones in seconds? That's the kind of thing you think about when you're walking 190 miles. You start off seeking a profound awareness of the complexity of life, and what you get is tiddlywinks and killer chickens.

Not that tiddlywinks is a frivolous thing. At least not the way Alan and Charles played it that night in the pub in Ingleby Cross. They spread their cloth on a table, cleared the area of customers and circled around the scattered winks, popping them at each other's colors and finally at the cup in the table's center. Alan was sardonic about what he considered to be his poor play, but Charles sighed deeply at the fate of each shot

Getting There

From Manchester International Airport take the train into Manchester Piccadilly Station. Catch a train to Carlisle, and there, switch to another for St. Bees (www.stbees.org.uk).
INSIDE TIP: Walk with naught but the shirt on your back: Sherpa (www.sherpa-walking-holidays.co.uk; 44 2085 772717) and other services will carry your bags for you.
FOR INFORMATION: Try Doreen Whitehead's B & B guide (butthouse@btinternet.com; 44 1748 886374) and visit Coast to Coast Guides (www.coasttocoastguides.co.uk) and the Wainwright Society (www.wainwright.org.uk).

The trail ends at the North Sea in Robin Hood's Bay (above). The old fishing village is now a mecca for tourists and weary Coast to Coasters alike. "Proceed with decorum," Wainwright wrote in his guide, "Go forward and put your boot in the first salt-water puddle."

and agonized over any errors that he made. He won, 5-2.

After Alfred Wainwright retired in early 1967, he became a full-time author, and even overcame his misanthropic nature sufficiently to participate in a BBC-TV series about his walks, which led to a certain fame. He finally divorced in 1968. (His son, Peter, who worked for an oil company in Bahrain, died just a couple of years ago.) And in 1970, he married his dream woman, "she whom he loved." Her name was Betty, and she didn't walk with him much, but she did drive him to the start of the trails.

So the latter parts of Wainwright's life were like the latter parts of our walk: the stresses of the past were gone, and a pleasant period ensued. Of course, our last days, like his, had their difficulties: various pains, occasional difficult climbs and a wild, wicked and ultimately exhilarating storm. We walked along an old railroad embankment on the ridges, clouds scudding close overhead, and leaned sideways against a 40-mile-an-hour breeze, feeling that when we came down off the hill we would find only horse carts in the lanes.

What we found, instead, was Lion Inn. It stood high on a ridge by a paved road, which looked foreign under the early-England sky. But in its pub was a small gathering of our community of Coast to Coasters: the women from Seattle, two men from southern England that we'd met earlier, and the tiddlywink champs. For a few minutes we were a little village unto ourselves, celebrating the proximity of the North Sea, which now seemed so close across the final hills.

The next day we hoofed it hard for 23 miles to the town of Grosmont, and the following day crossed the last 15½ miles. In late afternoon, 16 days after we began our journey, we walked down a steep cobbled street in Robin Hood's Bay and heard again the sound of waves and gulls.

The North Sea tide was high, and the water was more restless than on the other side of England. It surged hungrily against the cobbles, and a big sign warned: "Extreme danger on this slipway at high tide." Ignoring the sign, we walked into the water and let the North Sea wash our tired legs.

By the end of his life, Wainwright had lost most of his vision and could no longer read or hike. But no matter. "I live in a world of mists," he told the BBC in his final interview, in late 1990, "but by closing my eyes I can see a thousand walks as clearly as when I first walked them."

When A.W. died a month later, in January 1991, his wife and a close friend, following his wishes, took his ashes up to Haystacks, in Lakeland, and spread them near Innominate Tarn, the quiet place, the lonely place.

Wainwright painstakingly wrote many words in his guidebooks about the abiding passion of his life. But as I look back with nostalgia on nearly 200 miles in his good company and in the company of England, a simple note in *A Coast to Coast Walk* is my favorite: "There will be other years, other visits," A.W. wrote. "The hills will wait." ○

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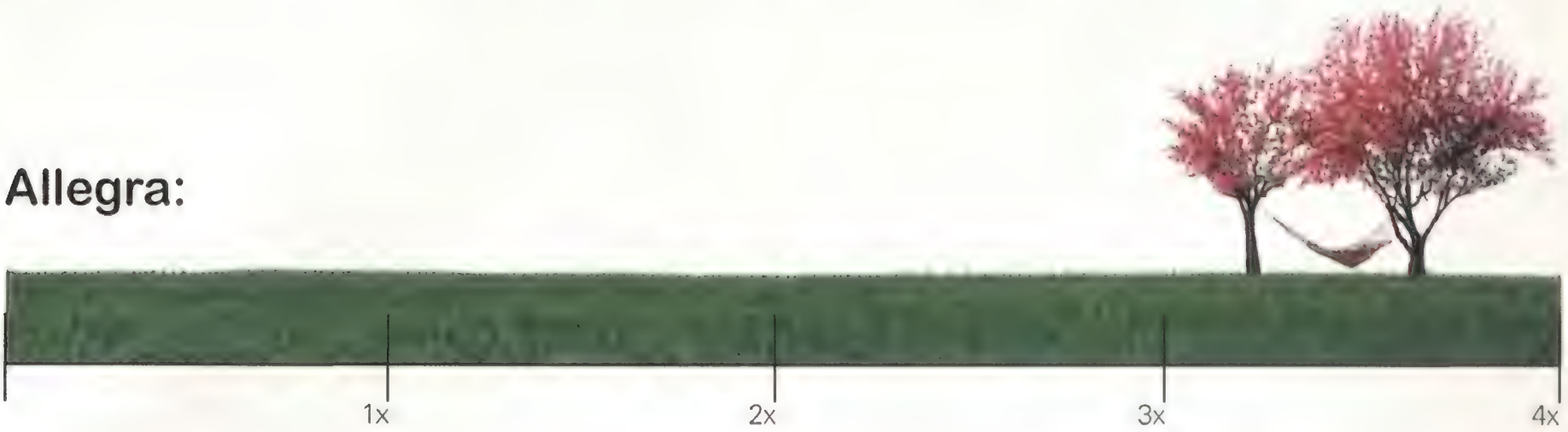

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Brief Summary of
Prescribing Information as of January 2003

ALLEGRA®
(fexofenadine hydrochloride)
Capsules and Tablets

INDICATIONS AND USAGE

Seasonal Allergic Rhinitis

ALLEGRA is indicated for the relief of symptoms associated with seasonal allergic rhinitis in adults and children 6 years of age and older. Symptoms treated effectively were sneezing, rhinorrhea, itchy nose/palate/throat, itchy/watery/red eyes.

Chronic Idiopathic Urticaria

ALLEGRA is indicated for treatment of uncomplicated skin manifestations of chronic idiopathic urticaria in adults and children 6 years of age and older. It significantly reduces pruritus and the number of wheals.

CONTRAINDICATIONS

ALLEGRA is contraindicated in patients with known hypersensitivity to any of its ingredients.

PRECAUTIONS

Drug Interaction with Erythromycin and Ketoconazole

Fexofenadine hydrochloride has been shown to exhibit minimal (ca. 5%) metabolism. However, co-administration of fexofenadine hydrochloride with ketoconazole and erythromycin led to increased plasma levels of fexofenadine hydrochloride. Fexofenadine hydrochloride had no effect on the pharmacokinetics of erythromycin and ketoconazole. In two separate studies, fexofenadine hydrochloride 120 mg twice daily (two times the recommended twice daily dose) was co-administered with erythromycin 500 mg every 8 hours or ketoconazole 400 mg once daily under steady state conditions to normal, healthy volunteers (n=24, each study). No differences in adverse events or QT_c interval were observed when patients were administered fexofenadine hydrochloride alone or in combination with erythromycin or ketoconazole. The findings of these studies are summarized in the following table:

Effects on steady-state fexofenadine hydrochloride pharmacokinetics after 7 days of co-administration with fexofenadine hydrochloride 120 mg every 12 hours (two times the recommended twice daily dose) in normal volunteers (n=24)

Concomitant Drug	$C_{max ss}$ *(Peak plasma concentration)*	$AUC_{(0-12)}$ *(Extent of systemic exposure)*
Erythromycin (500 mg every 8 hrs)	+82%	+109%
Ketoconazole (400 mg once daily)	+135%	+164%

The changes in plasma levels were within the range of plasma levels achieved in adequate and well-controlled clinical trials.

The mechanism of these interactions has been evaluated in *in vitro*, *in situ*, and *in vivo* animal models. These studies indicate that ketoconazole or erythromycin co-administration enhances fexofenadine gastrointestinal absorption. *In vivo* animal studies also suggest that in addition to increasing absorption, ketoconazole decreases fexofenadine hydrochloride gastrointestinal secretion, while erythromycin may also decrease biliary excretion.

Drug Interactions with Antacids

Administration of 120 mg of fexofenadine hydrochloride (2 x 60 mg capsule) within 15 minutes of an aluminum and magnesium containing antacid (Maalox®) decreased fexofenadine AUC by 41% and C_{max} by 43%. ALLEGRA should not be taken closely in time with aluminum and magnesium containing antacids.

Carcinogenesis, Mutagenesis, Impairment of Fertility

The carcinogenic potential and reproductive toxicity of fexofenadine hydrochloride were assessed using terfenadine studies with adequate fexofenadine hydrochloride exposure (based on plasma area-under-the-concentration vs. time [AUC] values). No evidence of carcinogenicity was observed in an 18-month study in mice and in a 24-month study in rats at oral doses up to 150 mg/kg of terfenadine (which led to fexofenadine exposures that were respectively approximately 3 and 5 times the exposure from the maximum recommended daily oral dose of fexofenadine hydrochloride in adults and children).

In *in vitro* (Bacterial Reverse Mutation, CHO/HGPRT Forward Mutation, and Rat Lymphocyte Chromosomal Aberration assays) and *in vivo* (Mouse Bone Marrow Micronucleus assay) tests, fexofenadine hydrochloride revealed no evidence of mutagenicity.

In rat fertility studies, dose-related reductions in implants and increases in postimplantation losses were observed at an oral dose of 150 mg/kg of terfenadine (which led to fexofenadine hydrochloride exposures that were approximately 3 times the exposure of the maximum recommended daily oral dose of fexofenadine hydrochloride in adults).

Pregnancy

Teratogenic Effects: Category C. There was no evidence of teratogenicity in rats or rabbits at oral doses of terfenadine up to 300 mg/kg (which led to fexofenadine exposures that were approximately 4 and 31 times, respectively, the exposure from the maximum recommended daily oral dose of fexofenadine in adults).

There are no adequate and well controlled studies in pregnant women. Fexofenadine should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

Nonteratogenic Effects. Dose-related decreases in pup weight gain and survival were observed in rats exposed to an oral dose of 150 mg/kg of terfenadine (approximately 3 times the maximum recommended daily oral dose of fexofenadine hydrochloride in adults based on comparison of fexofenadine hydrochloride AUCs).

Nursing Mothers

There are no adequate and well-controlled studies in women during lactation. Because many drugs are excreted in human milk, caution should be exercised when fexofenadine hydrochloride is administered to a nursing woman.

Pediatric Use

The recommended dose in patients 6 to 11 years of age is based on cross-study comparison of the pharmacokinetics of ALLEGRA in adults and pediatric patients and on the safety profile of fexofenadine hydrochloride in both adult and pediatric patients at doses equal to or higher than the recommended doses.

The safety of ALLEGRA tablets at a dose of 30 mg twice daily has been demonstrated in 438 pediatric patients 6 to 11 years of age in two placebo-controlled 2-week seasonal allergic rhinitis trials. The safety of ALLEGRA for the treatment of chronic idiopathic urticaria in patients 6 to 11 years of age is based on cross-study comparison of the pharmacokinetics of ALLEGRA in adult and pediatric patients and on the safety profile of fexofenadine in both adult and pediatric patients at doses equal to or higher than the recommended dose.

The effectiveness of ALLEGRA for the treatment of seasonal allergic rhinitis in patients 6 to 11 years of age was demonstrated in one trial (n=411) in which ALLEGRA tablets 30 mg twice daily significantly reduced total symptom scores compared to placebo, along with extrapolation of demonstrated efficacy in patients ages 12 years and above, and the pharmacokinetic comparisons in adults and children. The effectiveness of ALLEGRA for the treatment of chronic idiopathic urticaria in patients 6 to 11 years of age is based on an extrapolation of the demonstrated efficacy of ALLEGRA in adults with this condition and the likelihood that the disease course, pathophysiology and the drug's effect are substantially similar in children to that of adult patients. The safety and effectiveness of ALLEGRA in pediatric patients under 6 years of age have not been established.

Geriatric Use

Clinical studies of ALLEGRA tablets and capsules did not include sufficient numbers of subjects aged 65 years and over to determine whether this population responds differently from younger patients. Other reported clinical experience has not identified differences in responses between the geriatric and younger patients. This drug is known to be substantially excreted by the kidney, and the risk of toxic reactions to this drug may be greater in patients with impaired renal function. Because elderly patients are more likely to have decreased renal function, care should be taken in dose selection, and may be useful to monitor renal function. (See CLINICAL PHARMACOLOGY).

ADVERSE REACTIONS

Seasonal Allergic Rhinitis

Adults. In placebo-controlled seasonal allergic rhinitis clinical trials in patients 12 years of age and older, which included 2461 patients receiving fexofenadine hydrochloride capsules at doses of 20 mg to 240 mg twice daily, adverse events were similar in fexofenadine hydrochloride and placebo-treated patients. All adverse events that were reported by greater than 1% of patients who received the recommended daily dose of fexofenadine hydrochloride (60 mg capsules twice daily), and that were more common with fexofenadine hydrochloride than placebo, are listed in Table 1.

In a placebo-controlled clinical study in the United States, which included 570 patients aged 12 years and older receiving fexofenadine hydrochloride tablets at doses of 120 or 180 mg once daily, adverse events were similar in fexofenadine hydrochloride and placebo-treated patients. Table 1 also lists adverse experiences that were reported by greater than 2% of patients treated with fexofenadine hydrochloride tablets at doses of 180 mg once daily and that were more common with fexofenadine hydrochloride than placebo.

The incidence of adverse events, including drowsiness, was not dose-related and was similar across subgroups defined by age, gender, and race.

Table 1
Adverse experiences in patients ages 12 years and older reported in placebo-controlled seasonal allergic rhinitis clinical trials in the United States

Twice daily dosing with fexofenadine capsules at rates of greater than 1%

Adverse experience	*Fexofenadine 60 mg Twice Daily (n=679)*	*Placebo Twice Daily (n=671)*
Viral Infection (cold, flu)	2.5%	1.5%
Nausea	1.6%	1.5%
Dysmenorrhea	1.5%	0.3%
Drowsiness	1.3%	0.9%
Dyspepsia	1.3%	0.6%
Fatigue	1.3%	0.9%

Once daily dosing with fexofenadine hydrochloride tablets at rates of greater than 2%

Adverse experience	*Fexofenadine 180 mg once daily (n=283)*	*Placebo (n=293)*
Headache	10.6%	7.5%
Upper Respiratory Tract Infection	3.2%	3.1%
Back Pain	2.8%	1.4%

The frequency and magnitude of laboratory abnormalities were similar in fexofenadine hydrochloride and placebo-treated patients.

Pediatric. Table 2 lists adverse experiences in patients aged 6 to 11 years of age which were reported by greater than 2% of patients treated with fexofenadine hydrochloride tablets at a dose of 30 mg twice daily in placebo-controlled seasonal allergic rhinitis studies in the United States and Canada that were more common with fexofenadine hydrochloride than placebo.

Table 2
Adverse experiences reported in placebo-controlled seasonal allergic rhinitis studies in pediatric patients ages 6 to 11 in the United States and Canada at rates of greater than 2%

Adverse experience	*Fexofenadine 30 mg twice daily (n=209)*	*Placebo (n=229)*
Headache	7.2%	6.6%
Accidental Injury	2.9%	1.3%
Coughing	3.8%	1.3%
Fever	2.4%	0.9%
Pain	2.4%	0.4%
Otitis Media	2.4%	0.0%
Upper Respiratory Tract Infection	4.3%	1.7%

Chronic Idiopathic Urticaria

Adverse events reported by patients 12 years of age and older in placebo-controlled chronic idiopathic urticaria studies were similar to those reported in placebo-controlled seasonal allergic rhinitis studies. In placebo-controlled chronic idiopathic urticaria clinical trials, which included 726 patients 12 years of age and older receiving fexofenadine hydrochloride tablets at doses of 20 to 240 mg twice daily, adverse events were similar in fexofenadine hydrochloride and placebo-treated patients. Table 3 lists adverse experiences in patients aged 12 years and older which were reported by greater than 2% of patients treated with fexofenadine hydrochloride 60 mg tablets twice daily in controlled clinical studies in the United States and Canada and that were more common with fexofenadine hydrochloride than placebo. The safety of fexofenadine hydrochloride in the treatment of chronic idiopathic urticaria in pediatric patients 6 to 11 years of age is based on the safety profile of fexofenadine hydrochloride in adults and adolescent patients at doses equal to or higher than the recommended dose (see Pediatric Use).

Table 3
Adverse experiences reported in patients 12 years and older in placebo-controlled chronic idiopathic urticaria studies in the United States and Canada at rates of greater than 2%

Adverse experience	*Fexofenadine 60 mg twice daily (n=186)*	*Placebo (n=178)*
Back Pain	2.2%	1.1%
Sinusitis	2.2%	1.1%
Dizziness	2.2%	0.6%
Drowsiness	2.2%	0.0%

Events that have been reported during controlled clinical trials involving seasonal allergic rhinitis and chronic idiopathic urticaria patients with incidences less than 1% and similar to placebo and have been rarely reported during postmarketing surveillance include: insomnia, nervousness, and sleep disorders or paroniria. In rare cases, rash, urticaria, pruritus and hypersensitivity reactions with manifestations such as angioedema, chest tightness, dyspnea, flushing and systemic anaphylaxis have been reported.

OVERDOSAGE

Reports of fexofenadine hydrochloride overdose have been infrequent and contain limited information. However, dizziness, drowsiness, and dry mouth have been reported. Single doses of fexofenadine hydrochloride up to 800 mg (six normal volunteers at this dose level), and doses up to 690 mg twice daily for 1 month (three normal volunteers at this dose level) or 240 mg once daily for 1 year (234 normal volunteers at this dose level) were administered without the development of clinically significant adverse events as compared to placebo.

In the event of overdose, consider standard measures to remove any unabsorbed drug. Symptomatic and supportive treatment is recommended. Hemodialysis did not effectively remove fexofenadine hydrochloride from blood (1.7% removed) following terfenadine administration.

No deaths occurred at oral doses of fexofenadine hydrochloride up to 5000 mg/kg in mice (110 times the maximum recommended daily oral dose in adults and 200 times the maximum recommended daily oral dose in children based on mg/m²) and up to 5000 mg/kg in rats (230 times the maximum recommended daily oral dose in adults and 400 times the maximum recommended daily oral dose in children based on mg/m²). Additionally, no clinical signs of toxicity or gross pathological findings were observed. In dogs, no evidence of toxicity was observed at oral doses up to 2000 mg/kg (300 times the maximum recommended daily oral dose in adults and 530 times the maximum recommended daily oral dose in children based on mg/m²).

DOSAGE AND ADMINISTRATION

Seasonal Allergic Rhinitis

Adults and Children 12 Years and Older. The recommended dose of ALLEGRA is 60 mg twice daily, or 180 mg once daily. A dose of 60 mg once daily is recommended as the starting dose in patients with decreased renal function (see CLINICAL PHARMACOLOGY).

Children 6 to 11 Years. The recommended dose of ALLEGRA is 30 mg twice daily. A dose of 30 mg once daily is recommended as the starting dose in pediatric patients with decreased renal function (see CLINICAL PHARMACOLOGY).

Chronic Idiopathic Urticaria

Adults and Children 12 Years and Older. The recommended dose of ALLEGRA is 60 mg twice daily. A dose of 60 mg once daily is recommended as the starting dose in patients with decreased renal function (see CLINICAL PHARMACOLOGY).

Children 6 to 11 Years. The recommended dose of ALLEGRA is 30 mg twice daily. A dose of 30 mg once daily is recommended as the starting dose in pediatric patients with decreased renal function (see CLINICAL PHARMACOLOGY).

Please see product circular for full prescribing information.

Rx only

Brief Summary of Prescribing Information as of January 2003

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Stopping a Scourge

No one knows if SARS will strike again. But researchers' speedy work halting the epidemic makes a compelling case study of how to combat deadly viruses – BY DAVID BROWN

IT WAS 11 MINUTES after noon on the third Friday in March, and Sherif Zaki was in a meeting at the Centers for Disease Control and Prevention (CDC) when he got a message on his pager. *"I can't believe it,"* the message said, *"but it looks as though Tom's group has isolated a coronavirus. The cells were 'fried' by the microwave, but I'm pretty certain (90 percent) that's the result. Call me, I'm waiting on you to look before I pass on the info. Cynthia."*

Zaki is chief of infectious disease pathology at the CDC. Pathology, the study of the nature and effects of disease, is not one of the heart-pounding specialties in medicine. It's a field for brainy people who are happy to spend long periods of time at the microscope, scanning cellular landscapes for the unusual or telling feature. In their tolerance for high-risk monotony, they resemble air traffic controllers or lifeguards. As in those jobs, they are occasionally called on to move quickly. Zaki kept his counsel—the "Tom" of the message was sitting a few feet away—but messaged back: "I'll be right down." He excused himself from the meeting.

Six weeks after authorities said SARS had broken out in Asia, CDC scientists in Atlanta (from left, Goldsmith, Zaki and Humphrey) identified a coronavirus (below) as the culprit.

Much of what can be said of pathologists also holds for electron microscopists. In 19 years at the CDC, Cynthia Goldsmith, author of the text message to Zaki, had looked at a lot of hostile territory and picked out a lot of bad actors at a magnification of 40,000x. She was among the first to take a picture of the Sin Nombre hantavirus responsible for cases of fatal pneumonia on a Navajo reservation in the Southwest in 1993. In 1999, she was first to identify the Nipah virus, which killed about a hundred pig farmers and slaughterhouse workers in Malaysia and Singapore. Both times, though, other lab tests had given her hints of what to look for. This was different. She was looking for the possible agent of severe acute respiratory syndrome (SARS), a contagious, sometimes fatal infection that had appeared on two continents half a planet apart. Nine days earlier, the World Health Organization (W.H.O.) had issued a "global alert" about the disease. She peered through the electron microscope at a virus originally taken from the throat of a SARS patient in Asia and grown in a flask of cells at the CDC. What she was seeing wasn't what people said she should be seeing. Her heart raced as she and Zaki studied the images on a green phosphorescent screen.

GREG FOSTER; CENTERS FOR DISEASE CONTROL

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a corona, or crown—were far down any list of candidates for the cause of SARS. Coronaviruses can cause colds (though not most colds, which are caused by rhinoviruses) and, in premature infants, pneumonia. But in general, coronaviruses are so unthreatening to human health that the 2,629-page *Harrison's Principles of Internal Medicine,* the world's best-selling English-language medical textbook, devotes a mere six paragraphs to them.

Yet Goldsmith was certain that she was indeed looking at a coronavirus. In 15 minutes, Zaki was convinced too. He and Goldsmith went down the hall, where Charles Humphrey, another electron microscopist, was looking at a virus sample from the same patient, Carlo Urbani. The first W.H.O. physician to investigate a SARS case, at the Vietnam French Hospital of Hanoi, Urbani would die eight days after the CDC researchers made their observation. Humphrey used a negative-stain technique—basically a form of backlighting—to outline the material. The virus sample was in poor condition, which made identification difficult. Nevertheless, Zaki, with studied neutrality, asked Humphrey what he thought he was seeing. As Zaki later explained, "Part of science is to do things in blinded fashion. I didn't want to ask him a leading question. I was trying to avoid that at all costs."

Humphrey has been looking at infectious agents with electron microscopes since 1968. "It could be an influenza [virus] or a coronavirus," he told Zaki. "I was not quite ready to lean one way or the other," he said later. "It had characteristics of both." After Zaki and Goldsmith peered at Humphrey's images, they took him to look at Goldsmith's. By the middle of the afternoon, the trio was ready to share its conclusion with CDC colleagues: it was a coronavirus. Three days later, the CDC told the world.

In retrospect, it's the excitement of the discovery that medical researchers remember. But at the time, they also felt apprehension. A new, often fatal disease was loose in sever-

al densely populated cities in China, and among the more frequent victims were medical workers.

The cause of the disease is a virus around 100 nanometers in diameter, or four-millionths of an inch. Genetically, the SARS virus (SARS-CoV) doesn't closely resemble any of the dozen well-studied coronaviruses known to infect animals or people. It doesn't even fall into one of the genus's three broad genetic groups, forming instead a new branch on the family tree. Its origin is unknown—and so, in a sense, is its destination. Biologists haven't yet charted the full range of human tissue it can inhabit or attack. And nobody knows whether it's here to stay as a permanent disease that human flesh is heir to.

What scientists do know about coronaviruses in general, and SARS-CoV in particular, suggests that infection may differ considerably from victim to victim, persist over time and be difficult to vaccinate against. SARS-CoV stores genetic information in single-stranded RNA, a less stable and more mutable molecule than the double-stranded DNA used by fungi, human beings and everything in between. Coronaviruses have a larger genome, or collection of hereditary material, than any RNA virus studied so far. In addition, they carry an unusual enzyme that permits two sister viruses to swap genes if they happen to find themselves infecting the same cell. That capacity to form "recombinants," or hybrids, as well as the virus's large genome, enable the genus to easily gain or lose traits. Such traits may include the ability to infect new species, elude the immune system and change residence in the body over time.

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SARS hit Asia hard, prompting a profusion of surgical masks to reduce its spread. Mercifully, the disease killed no children (kindergartners in Hong Kong this past May).

The story of transmissible gastroenteritis virus in pigs demonstrates how coronaviruses acquire new powers. The disease, known since the 1940s, causes severe diarrhea in piglets. Periodic outbreaks have killed whole generations of animals on some farms. In 1989, farmers in Europe began noticing a new respiratory infection in pigs. The cause turned out to be a genetically altered form of the gastroenteritis virus that had evolved the capacity to invade the lungs. Coronaviruses are changelings, multitaskers, rule breakers. Bovine coronavirus causes several different diseases in cattle. In calves, it causes severe diarrhea; in yearlings, a pneumonia called shipping fever; in adult cows, a dysentery-like illness.

Coronaviruses are versatile in other ways too, with some strains able to in-

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Urbani (his April 8 memorial service in Hanoi) died after studying SARS patients.

fect more than one species. A study two years ago showed that a coronavirus isolated from cattle could also infect baby turkeys, though not, curiously, baby chickens. "Coronaviruses may be much more promiscuous than we originally thought," says Linda Saif, a veterinary scientist and virologist at Ohio State University.

Scientists have only begun to learn the rules of engagement the SARS coronavirus follows. Like many of its kin, it appears to be a lung-and-gut bug; people die from lung damage; about one-fifth of its victims also have vomiting and diarrhea. But SARS-CoV behaves unlike many respiratory viruses. For one thing, the disease it causes develops slowly. Also, there's an almost miraculous sparing of children. In the recent SARS outbreak, few children became ill and none under age 16 died. Scientists don't yet know why.

If SARS-CoV entered the human population from animals, it is by no means the first virus to make the jump between species. Measles, which has afflicted human beings for at least 2,000 years and still kills more than 700,000 people annually (mostly children), is caused by a virus whose closest relative causes rinderpest, a disease of cattle. The domestication of animals brought human beings and bovids together in large numbers, and some of the herd's pathogens adapted to life in the herders. A similar leap ages ago may have introduced human populations to the smallpox virus, which has since been eradicated.

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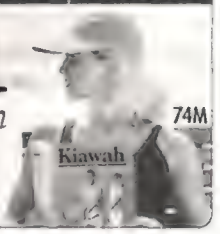

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tion about SARS—is it with us forever?—can't yet be answered. According to preliminary reports, some exotic mammals in southern China that are caught and sold for food (including the masked palm civet) harbor a coronavirus identical to SARS-CoV with an important exception: the animal virus's RNA has an additional 29 nucleotides, or chemical subunits. The similarity suggests that the SARS virus arose from the animal virus. If those 29 missing nucleotides hold the key to the emergence of SARS-CoV, its future may depend on how frequently that particular genetic deletion occurs. It may not happen again for decades, or centuries. Or it could happen next year. But even if the virus's genetic material changes frequently, future epidemics may possibly be prevented merely by keeping people away from palm civets and other infected species.

Alternatively, SARS may behave like Ebola hemorrhagic fever, which appears periodically. Ebola emerged in 1976 in simultaneous outbreaks in Zaire and Sudan. The virus strikes in Africa every few years, killing 50 to 90 percent of the people it infects, and then vanishes. Despite great effort, scientists still haven't found the natural animal host or reservoir for Ebola virus, and that makes it harder to prevent periodic outbreaks.

By early July, the W.H.O. declared that the outbreak was over. At last count, 8,399 people in 30 nations had been identified as "probable" SARS cases and 813 of them had died.

Of course, even though the SARS epidemic is officially over, the virus may actually still be with us. A few survivors are known to have carried it for months and may be contagious. It's also conceivable that a handful of people with the disease have escaped detection. For those reasons, some medical experts believe that only a vaccine can rid humanity of SARS for certain. Making and testing one will require at least three years of work, says Gary Nabel, director of the vaccine research center at the National Institute of Allergy and Infectious Diseases. (The

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[1] Potsky AL, Legler J, Albertsen PC, Stanford JL, Gilliland FD, Hamilton AS, et al "Health Outcomes After Radical Prostatectomy or Radiotherapy for Clinically Localized Prostate Cancer: Results from the Prostate Cancer Outcomes Study (PCOS)." J Natl Cancer Inst 2000; 92:1582-1592
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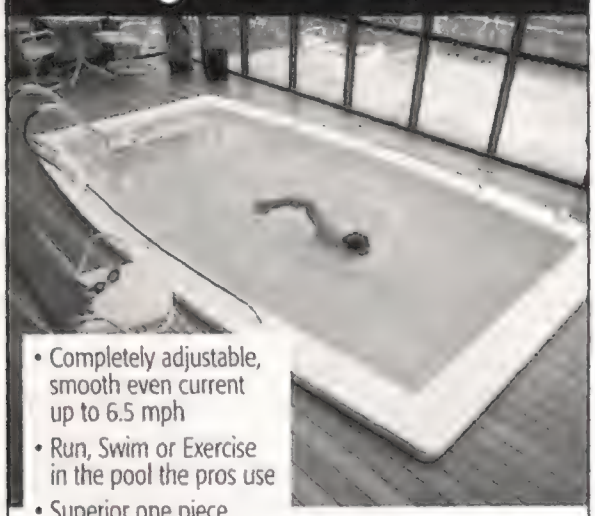

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SARS does not necessarily augur a new millennium of ever-accumulating human scourges.

same is likely to be true for anti-SARS drugs.) Even so, animal coronavirus vaccines have a spotty record. Some provide only transient protection. Others, like the vaccine against feline coronavirus, can even worsen an infection under some circumstances. Until good drugs and an effective vaccine are available, the best approach to preventing the global spread of the disease is decidedly old-fashioned: identifying infected persons, isolating them until they recover and quarantining people who've had close contact with the victims. Those measures, applied assiduously in recent months and in many nations, appear to have accomplished something nearly unheard of in the history of medicine—halting an epidemic respiratory infection, at least temporarily.

For his part, the CDC's Zaki is betting on SARS's return. "I don't see any reason why it shouldn't come back," he says. "We can learn from history. If it happened once, it can happen again."

The flip side of such fatalism—or is it realism?—is that despite some predictions that the emergence of SARS augurs a new millennium of ever-accumulating human scourges, nothing about it is foreordained. We shouldn't forget that thanks to sanitation, affluence and medicine, in many parts of the world far more infectious diseases have retreated than have emerged in the past century. The appearance of SARS, like so many important historical events, was the product of dozens, or hundreds, of small occurrences, many of them chance. It was neither inevitable nor entirely unexpected. It's just what happened. ○

DAVID BROWN, a physician, covers science and medicine for the Washington Post.

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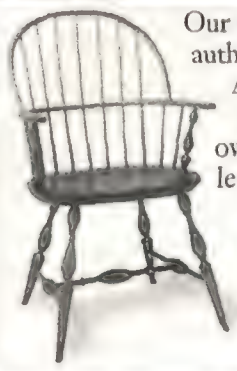

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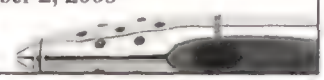

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NINA BURLEIGH

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Smithson

Author Nina Burleigh's absorbing account of Smithson's life and times constitutes an admirable exercise in biographical detective work. Presumably born in Paris in 1765, Smithson was the illegitimate son of Elizabeth Macie, a 33-year-old English heiress, and the Duke of Northumberland, one of the wealthiest men in England.

An Oxford-trained chemist, Smithson's passion was mineralogy. He inherited his mother's fortune in 1800 and continued to commit his resources to the common good. His decision, Burleigh suggests, can be partly attributed to his being "a charter member in the Royal Institution, organized by British elites to bring scientific knowledge to the masses."

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Reviewer ALINA CORDAY-TAYLOR is based in Washington, D.C.

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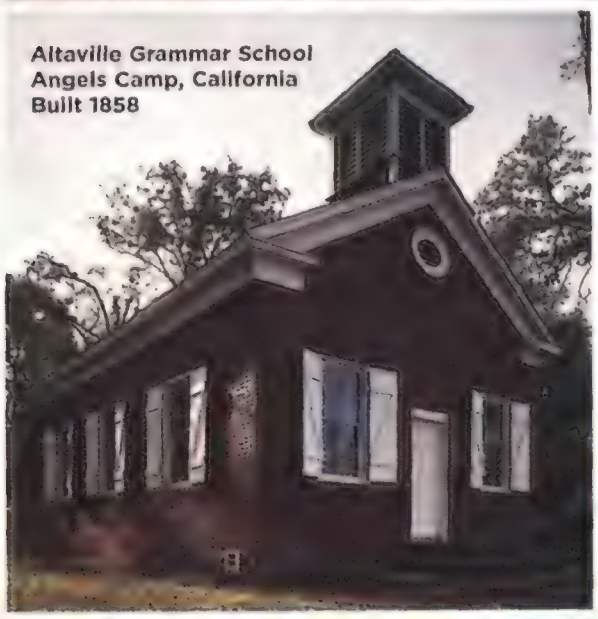

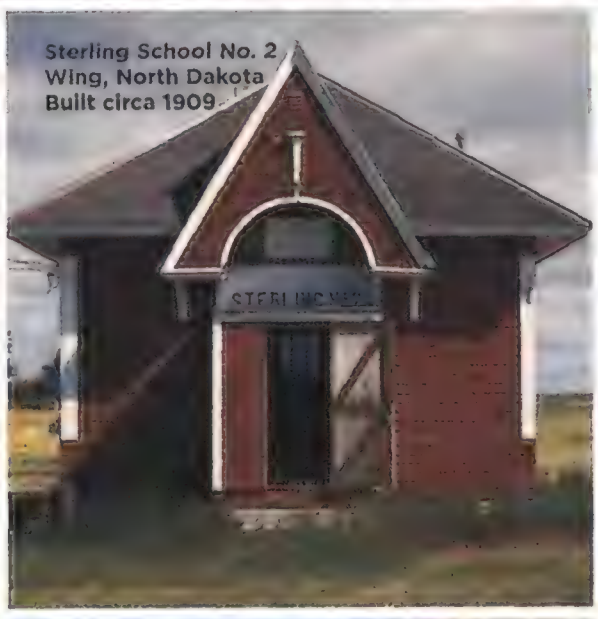

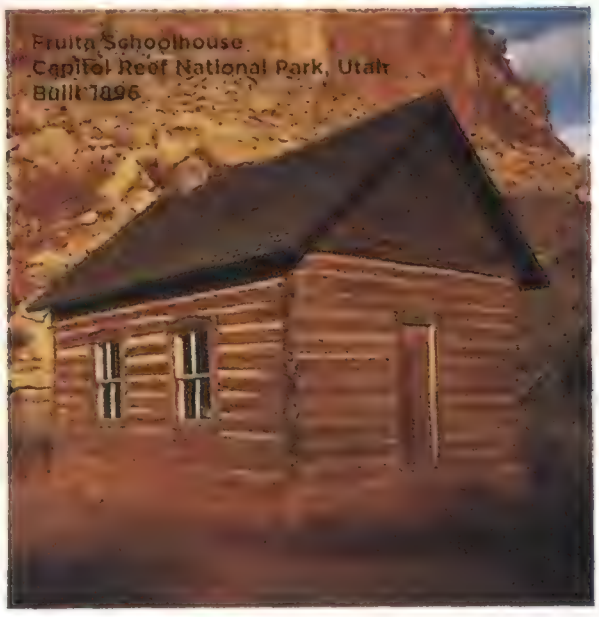

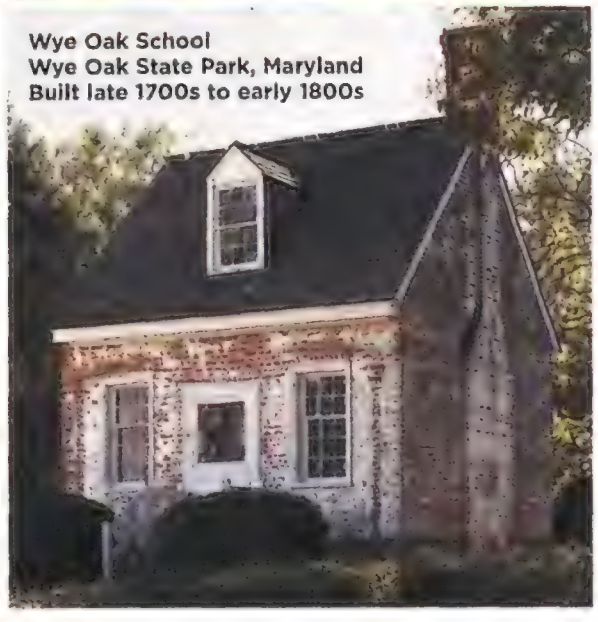

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Expert: Anthony Brown

- **Portland State University**
  Lincoln Hall Room 75
  1620 SW Park Avenue
  For information, call (800) 774-5020.

  Note: Public viewing only; participation by invitation only

SATURDAY, NOVEMBER 8

11:00am-12:00pm

Gardening for Insects: Be More Green in Your Garden
Expert: Nathan Erwin
In cooperation with Portland Classical Chinese Garden

- **Port of Portland**
  121 NW Everett Street
  For information, call (503) 228-8131, x1008.

11:00am-3:00pm
[detailed times below]

Family Art Day
Children ages 4-10; accompanied by an adult

- **CM2—Children's Museum 2nd Generation**
  East Studio
  4015 SW Canyon Road

Program One:
CultureFest Collage Creation
Including a chance to win a family trip to the Smithsonian Institution in Washington, D.C.!
Session 1:
10:00-11:00am
Session 2:
2:00-3:00pm

Program Two: I Got Rhythm
Expert: Anthony Brown
Making and using a percussion instrument.
Session 1:
11:00am-12:00pm
Session 2:
1:00-2:00pm

For information, call (503) 223-6500.

SATURDAY, NOVEMBER 8

1:00-2:00pm

Material Explorations
Expert: Tacey Rosolowski

- **Central Library**
  801 SW 10th Avenue
  For information, call (503) 988-5123.

2:00-3:00pm

Farming for Butterflies: Nature's Crop
Expert: Nathan Erwin

- **Oregon Zoo**
  4001 SW Canyon Road
  Cascade Crest Banquet Center
  For information, call (503) 221-1561, x0.

3:00-4:30pm

Open Rehearsal with Anthony Brown
Expert: Anthony Brown

- **Portland State University**
  Smith Memorial Center Ballroom
  1825 SW Broadway

  Note: Rehearsal session only; public invited to listen

SATURDAY. NOVEMBER 8

7:00-9:30pm
[detailed times below]

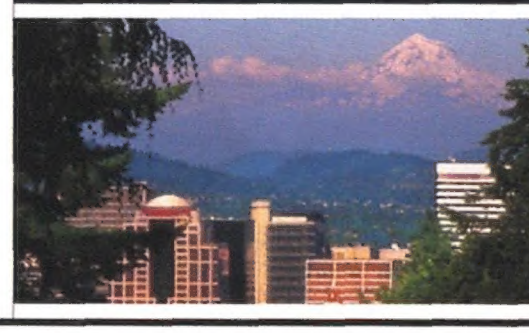
Life by Design
Two of the country's leading design experts discuss its impact on daily life
In cooperation with the Contemporary Crafts Gallery

Program One:
Intimacy of Jewelry
Expert: Tacey Rosolowski
7:00-8:00pm
[one session only]

Program Two:
How Design Just Does It
Expert: John R. Hoke III
8:15-9:15pm
[one session only]

- **Ecco Trust Building**
  2nd floor
  NW Irving and 10th Avenue
  For information, call (503) 223-2654.

Continued...



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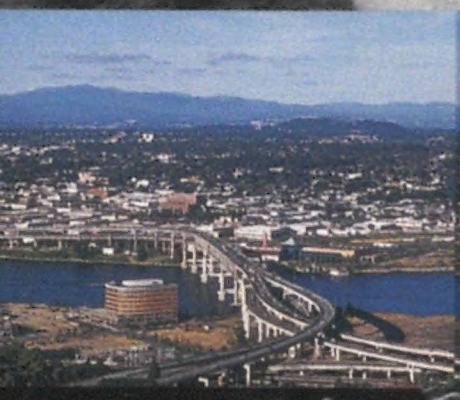

Smithsonian Magazine's CultureFest 2003 • Portland, Oregon • November 7-9, 2003

PROGRAM OF PUBLIC EVENTS *(continued)*

SATURDAY, NOVEMBER 8

7:30-9:30pm

***Smithsonian* Magazine's CultureFest Jazz Jam**

Jazz concert and commentary featuring Portland State University Jazz Ensemble, favorite Portland jazz musicians, and special guest Dr. Anthony Brown.

- **Portland State University**
  Smith Memorial Center Ballroom
  1825 SW Broadway
  Tickets on sale at noon, Sept. 1, 2003.
  Tickets: $15 + service fee
  For ticket information, call (503) 224-8499 or (800) 992-8499 or visit www.ticketswest.com

Schedules may change. For the latest information, go to www.culturefest.com or call (800) 774-5020.

All programs free of charge unless otherwise noted.

Photos courtesy of Portland Oregon Visitors Association

The Smithsonian Associates

CultureFest is coordinated by The Smithsonian Associates (TSA). Established over 30 years ago as the membership, cultural and educational arm of the Smithsonian Institution, TSA is recognized as the world's largest, most-esteemed, museum-based continuing education and study tour program.

SUNDAY, NOVEMBER 9

12:00-4:00pm

Family Science Day

- **Oregon Museum of Science and Industry [OMSI]**
  1945 SE Water Avenue
  Activities for children ages 4-12, accompanied by an adult.
  12:00-1:00pm and 2:00-4:00pm

Program: Discover an Insect's Secret Garden
Expert: Nathan Erwin
1:00-2:00pm
[one session only]
For information, call (503) 797-4588 or check www.omsi.edu

1:00-4:00pm

Reception & Open House

- **Pendleton Home Store**
  220 NW Broadway

Program: Designing a Pendleton Blanket for the National Museum of American Indian
Expert: Truman Lowe
1:30-2:30pm
Discussion followed by blanket signing
For information, call (503) 535-5444.

2:30-3:30pm

Historical Overview of Jazz
Expert: Anthony Brown

- **North Portland Library**
  512 N. Killingsworth
  For information, call (503)-988-5394.

4:30-5:30pm

Jazz Dialogue with Anthony Brown
Expert: Anthony Brown
In cooperation with the Jazz Society of Oregon

- **The Blue Monk**
  3314 SE Belmont
  For information, call (800) 774-5020.
  Includes live radio broadcast on KMHD 89.1 FM

Smithsonian MAGAZINE

ABOUT THE SMITHSONIAN EXPERTS

Dr. Anthony Brown
Dr. Anthony Brown has been called "one of the most articulate men in jazz" by the *San Francisco Chronicle* and has performed with jazz greats around the world. Recently named a 2003 Guggenheim Fellow, he currently directs the Grammy-nominated Asian American Orchestra. He served as curator of American Musical Culture and director of the Jazz Oral History Program at the Smithsonian National Museum of American History from 1992-96.

Nathan Erwin
Manager of the Smithsonian Institution's Otto Orkin Insect Zoo in the National Museum of Natural History, Mr. Erwin cares for and cultivates an astonishing array of insects, spiders and crustaceans. He even traveled throughout Central and South America to personally collect some of the exotic specimens under his care. A world-renowned expert on insects, he has appeared on *Late Night with David Letterman*, the National Geographic and Discovery channels, the BBC, and countless news programs – usually with live residents of the Insect Zoo.

John R. Hoke III
A juror for the Cooper-Hewitt Museum's 2003 National Design Awards, John Hoke directs a Nike design team that creates more than 200 styles of new footwear each year. He was also the designer and creative director for NIKETOWN in New York and London, and the creative director of Nike's Brand Design Studio. Prior to joining Nike, Mr. Hoke worked as an architectural, industrial, graphic and product designer at architect Michael Graves' office.

Truman Lowe
Internationally acclaimed artist Truman Lowe's sculptures of wood and metal evoke the rivers, streams and woodlands of his native Wisconsin, where his skilled artisan parents created baskets and ribbonwork in the Ho-Chunk tradition. Curator of contemporary art at the National Museum of the American Indian, Lowe has exhibited at the Heard Museum in Phoenix, the Eiteljorg Museum of American Indians & Western Art in Indianapolis and the National Gallery of Art in Ottawa. One of his large outdoor sculptures was included in an exhibit at the White House in1998.

Dr. Tacey Rosolowski
A Fellow at the Smithsonian American Art Museum and Renwick Gallery, Dr. Tacey Rosolowski was awarded the 2003 James Renwick Fellowship in American Craft, a residency fellowship supporting research in the cultural status of contemporary jewelry. A specialist in art jewelry, adornment and material culture, Dr. Rosolowski's positions as professor, lecturer, curator and writer have taken her to universities, museums and other cultural and educational facilities across the country.